

DR. S.P. TEKUR.

SEARCH SUBJECT: SPIRULINA

&lt;1&gt;

Authors

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Institution

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Title

Effects of structural modification of calcium spirulan, a sulfated polysaccharide from *Spirulina platensis*, on antiviral activity.

Source

Chemical &amp; Pharmaceutical Bulletin. 49(1):108-10, 2001 Jan.

Abstract

Calcium ion binding with the anionic part of a molecule was replaced with various metal cations and their inhibitory effects on the replication of herpes simplex virus type 1 were evaluated. Replacement of calcium ion with sodium and potassium ions maintained the antiviral activity while divalent and trivalent metal cations reduced the activity. Depolymerization of sodium spirulan with hydrogen peroxide decreased in antiviral activity as its molecular weight decreased.

&lt;2&gt;

Authors

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Institution

School of Environmental Sciences, B.B.Ambedkar University, Lucknow-226025, India.

Title

Calcium and phosphate regulation of nitrogen metabolism in the cyanobacterium *Spirulina platensis* under the high light stress.

Source

Current Microbiology. 41(5):368-73, 2000 Nov.

Abstract

High light stress (40 W/m<sup>2</sup>)-induced alterations in the nitrogen assimilatory enzymes in *Spirulina platensis* were studied under the Ca(2+) and phosphate (Pi)-supplemented as well as starved conditions. Results revealed that activities of nitrate reductase (NR), amino acid transferases (AST/GOT and ALT/GPT), and protease enzymes in the high-light-incubated cells were relatively higher under the Ca(2+)- and Pi-starved conditions. On the contrary, relative rates of glutamine synthetase (GS) and ATPase activities were lower in the Ca(2+)- and Pi-starved cells. But the *Spirulina* cells under the Ca(2+)- and Pi-added conditions showed enhanced activity of both GS and ATPase enzymes. During the high-light stress, a decline in the GS activity, particularly under the Ca(2+)- and Pi-starved conditions, was indicative of a nitrogen starvation-like condition. This could be one of the reasons for induction of the NR and protease enzymes. A higher rate of GS activity was recorded under both the Ca(2+)- and Pi-supplemented conditions, perhaps owing to the enhanced rate of ATPase activity in such conditions. But a declining pattern of both NR and protease activities in the presence of Ca(2+) and Pi, despite the higher rate of ATPase activity, might involve some other mechanism like the protein-kinase system.

&lt;3&gt;

Authors

Verma K. Mohanty P.

Institution

School of Life Sciences, Jawaharlal Nehru University, New Delhi, India.

Title

Changes of the photosynthetic apparatus in *Spirulina cyanobacterium* by sodium stress.

Source

Zeitschrift für Naturforschung. Section C. Journal of Biosciences. 55(1-2):16-22, 2000 Jan-Feb.

Abstract

*Spirulina platensis* trichomes grown in Zarrouks medium having total Na<sup>+</sup> concentration as 0.14 M when transferred to fresh Zarrouks medium containing enhanced level of Na<sup>+</sup> ions equal to 0.86 M showed 30% more accumulation of Na<sup>+</sup> intracellularly as compared to the control. An inhibition of photosystem II activity to almost 66% was observed. Also due to this exposure to high Na<sup>+</sup>, the room temperature absorption characteristics of *Spirulina* trichomes and the thylakoid membrane preparations were altered indicating changes in the chromophore protein interactions and alterations in the phycocyanin/allophycocyanin ratio; there by affecting the energy harvest and energy transfer processes. An increase in the carotenoid absorption was two fold over the control in the treated sample. Similarly, room temperature and low temperature (77 K) fluorescence emission spectra collectively suggested alterations in the chlorophyll a emissions, F 726 of photosystem I reflecting changes in the lipid protein environment of the thylakoid. Our results indicate that in *Spirulina* the enhanced Na<sup>+</sup> level alters the energy harvest and transfer processes. It also affected the emission characteristics of chlorophyll a of photosystem I.

<4>

Authors

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Institution

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Title

Pseudovitamin B(12) is the predominant cobamide of an algal health food, spirulina tablets.

Source

Journal of Agricultural & Food Chemistry. 47(11):4736-41, 1999 Nov.

Abstract

The vitamin B(12) concentration of an algal health food, spirulina (*Spirulina* sp.) tablets, was determined by both *Lactobacillus leichmannii* ATCC 7830 microbiological and intrinsic factor chemiluminescence methods. The values determined with the microbiological method were approximately 6-9-fold greater in the spirulina tablets than the values determined with the chemiluminescence method. Although most of the vitamin B(12) determined with the microbiological method was derived from various vitamin B(12) substitutive compounds and/or inactive vitamin B(12) analogues, the spirulina contained a small amount of vitamin B(12) active in the binding of the intrinsic factor. Two intrinsic factor active vitamin B(12) analogues (major and minor) were purified from the spirulina tablets and partially characterized. The major (83%) and minor (17%) analogues were identified as pseudovitamin B(12) and vitamin B(12), respectively, as judged from data of TLC, reversed-phase HPLC, <sup>1</sup>H NMR spectroscopy, ultraviolet-visible spectroscopy, and biological activity using *L. leichmannii* as a test organism and the binding of vitamin B(12) to the intrinsic factor.

<5>

Authors

Mazo VK. Gmoshinski [Latin small letter i with breve] IV. Sokolova AG. Zorin SN. Danilina LL. Litvinova AV. Radchenko SN.

Title

[Effect of biologically active food additives containing autolysate of baker's yeast and spirulina on intestinal permeability in an experiment].  
[Russian]

Original Title

Vliianie biologicheskii aktivnykh dobavok k pishche, soderzhashchikh avtolizat pekarskikh drozhzhe [Latin small letter i with breve] i spirulinu, na pronitsaemost' kishechnika v eksperimente.

Source

Voprosy Pitaniia. 68(1):17-9, 1999.

Abstract

Influence of bioactive food supplements (BFA) intake on intestinal barrier permeability to macromolecules of polyethylene glycol 4000 was studied in rats with intestinal anaphylaxis and after external gamma-irradiation. BFA studied included autolysed baker's yeast ("Vitasil") and edible algae *Spirulina platensis*. Intake of complex additive Vitasil + *Spirulina* resulted in significant diminution of permeability before irradiation and its partial normalization (24% decrease) after irradiation. *Spirulina* additive intake led to practically complete normalization of permeability (1.84 times decrease) in anaphylactic rats. It is concluded that *Spirulina* and Vitasil are promising BFA for organism general resistance elevation.

<6>

Authors

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Institution

Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Pab. II, Argentina.

Title

Lactic acid bacteria growth promoters from *Spirulina platensis*.

Source

International Journal of Food Microbiology. 45(3):225-8, 1998 Dec 22.

Abstract

*Spirulina* has been used for many years as human food because of its high protein content and nutritional value. Some strains also produce bioactive substances that may inhibit or promote microbial growth. *Lactococcus lactis*, *Streptococcus thermophilus*, *Lactobacillus casei*, *Lactobacillus acidophilus*, and *Lactobacillus bulgaricus* were grown in rich media, MRS and RM, as well as in minimal saline medium with and without addition of extracellular products obtained from a late log phase culture of *Spirulina platensis* in Zarrouk medium. In both MRS and RM media, the extracellular products significantly promote the growth of the lactic acid bacteria assayed. This stimulatory effect was observed in media with pH adjusted to 5.3, 6.3 and 7.0. No effect was observed in minimal saline medium.

<7>

Authors

Miranda MS. Cintra RG. Barros SB. Mancini Filho J.

Institution

Faculdade de Farmacia e Bioquimica, Universidade Federal da Bahia, Salvador, Brasil.

Title

Antioxidant activity of the microalga *Spirulina maxima*.

Source

Brazilian Journal of Medical & Biological Research. 31(8):1075-9, 1998 Aug.

Abstract

*Spirulina maxima*, which is used as a food additive, is a microalga rich in protein and other essential nutrients. *Spirulina* contains phenolic acids, tocopherols and beta-carotene which are known to exhibit antioxidant properties. The aim of the present study was to evaluate the antioxidant capacity of a *Spirulina* extract. The antioxidant activity of a methanolic

extract of Spirulina was determined in vitro and in vivo. The in vitro antioxidant capacity was tested on a brain homogenate incubated with and without the extract at 37 degrees C. The IC50 (concentration which causes a 50% reduction of oxidation) of the extract in this system was 0.18 mg/ml. The in vivo antioxidant capacity was evaluated in plasma and liver of animals receiving a daily dose of 5 mg for 2 and 7 weeks. Plasma antioxidant capacity was measured in brain homogenate incubated for 1 h at 37 degrees C. The production of oxidized compounds in liver after 2 h of incubation at 37 degrees C was measured in terms of thiobarbituric acid reactant substances (TBARS) in control and experimental groups. Upon treatment, the antioxidant capacity of plasma was 71% for the experimental group and 54% for the control group. Data from liver spontaneous peroxidation studies were not significantly different between groups. The amounts of phenolic acids, alpha-tocopherol and beta-carotene were determined in Spirulina extracts. The results obtained indicate that Spirulina provides some antioxidant protection for both in vitro and in vivo systems.

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1 of 6

TI: Effects of dietary Spirulina maxima on endothelium dependent vasomotor responses of rat aortic rings.

AU: Paredes-Carbajal-MC; Torres-Duran-PV; Diaz-Zagoya-JC; Mascher-D; Juarez-Oropeza-MA

AD: Department of Physiology, School of Medicine, UNAM, Mexico D.F., Mexico. majo@servidor.unam.mx

SO: Life-Sci. 1997; 61(15): PL 211-9

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LA: ENGLISH

AB: The aim of this study was to evaluate the effects of Spirulina maxima on vasomotor responses of aorta rings from male Wistar rats fed on a purified diet. For this purpose, the animals (weighing 200-240 g) were allocated randomly in two groups. One receiving purified control diet (A) and the other receiving purified diet containing 5% Spirulina (B). Purified diets were according to American Institute of Nutrition guidelines and adjusted to Spirulina protein content. All animals were fed (20 g/day/rat) during two weeks, receiving water ad libitum and 12 h. light-dark cycles. Spirulina maxima effects were evaluated by concentration-response (CR) curves of aorta rings with or without endothelium to phenylephrine (PE), both in presence and absence of indomethacin (Indom) or indomethacin plus L-NAME (Indom. + L-NAME), and to carbachol (CCh). Aorta rings with endothelium from group B showed, relative to corresponding rings from group A: 1) a significant decrease in the maximal tension developed in response to PE. 2) this decrease was reverted by Indom. 3) Indom. + L-NAME induced an additional increase in the contractile responses to PE. 4) a significant shift to the left of the CR curve to CCh. No significant differences were observed in the tension developed in response to PE in rings without endothelium from either group. These results suggest that Spirulina maxima may decrease vascular tone by increasing the synthesis and release of both a vasodilating cyclooxygenase-dependent product of arachidonic acid and nitric oxide, as well as by decreasing the synthesis and release of a vasoconstricting eicosanoid from the endothelial cells.

2 of 6

TI: The Spirulina platensis adenylate cyclase gene, cyaC, encodes a novel signal transduction protein.

AU: Kasahara-M; Yashiro-K; Sakamoto-T; Ohmori-M

AD: Department of Life Sciences, Graduate School of Arts and Sciences, University of Tokyo, Japan.

SO: Plant-Cell-Physiol. 1997 Jul; 38(7): 828-36

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LA: ENGLISH

AB: A cyaC gene encoding an adenylate cyclase of the filamentous cyanobacterium Spirulina platensis was sequenced. The predicted amino acid sequence of the C-terminal region of cyaC is similar to the catalytic domains of adenylate cyclases in other cyanobacteria and eukaryotes. The sequences of other regions are similar to those of proteins consisting of the bacterial two-component signal transduction system: the sensory kinase and the response regulator. The predicted gene product of cyaC contains, from the N-terminal end, a receiver domain of the response regulator protein (R1), a domain similar to the ETR1 of *Arabidopsis thaliana*, a transmitter domain of the sensory kinase protein, a receiver domain of the response regulator protein (R2), and a catalytic domain

of adenylate cyclase. The *cyaC* gene was expressed as an affinity-tagged protein in *Escherichia coli*, and the recombinant protein was purified. The purified protein had adenylate cyclase activity which was activated by  $Mu^{2+}$ . The results of Western blotting using an anti-CyaC antiserum and the *S. platensis* cell extract confirmed that *cyaC* gene is expressed in *S. platensis*.

3 of 6

TI: Thermal denaturation of glutathione reductase from cyanobacterium *Spirulina* *maxima*.

AU: Rojo-Dominguez-A; Hernandez-Arana-A; Mendoza-Hernandez-G; Rendon-JL

AD: Departamento de Bioquímica, Facultad de Medicina, Universidad Nacional Autónoma de México, México, D.F., México.

SO: *Biochem-Mol-Biol-Int.* 1997 Jul; 42(3): 631-9

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LA: ENGLISH

AB: The thermal unfolding of glutathione reductase (NAD(P)H:GSSG oxidoreductase EC 1.6.4.2.) from cyanobacterium *Spirulina* *maxima* was monitored by differential scanning calorimetry and circular dichroism at neutral pH. Covalent cross-linking of enzyme at different temperatures revealed dimer as the species undergoing the thermal transition. A single endotherm was observed, but its thermodynamic parameters showed dependence on the scan rate. In the transition ies was observed. Analysis of the enzyme

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1 of 1

TI: Fluorescence spectroscopy of the longwave chlorophylls in trimeric and monomeric photosystem I core complexes from the cyanobacterium Spirulina platensis.

AU: Karapetyan-NV; Dorra-D; Schweitzer-G; Bezsmerdnaya-IN; Holzwarth-AR

AD: Max-Planck-Institut für Strahlenchemie, Ruhr, Germany.

SO: Biochemistry. 1997 Nov 11; 36(45): 13830-7

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Call Number: From: 1964-1987

ISSN: 0006-2960

PY: 1997

LA: ENGLISH

CP: UNITED-STATES

AB: The organization and interaction of chlorophylls (Chl) and the kinetics of the energy transfer in the core antenna of photosystem I (PSI) trimeric and monomeric complexes, isolated from Spirulina platensis with Triton X-100 have been studied by stationary and time-resolved fluorescence. At 295 K both complexes show an unusually intense long-wavelength emission band with prominent peaks at 730 nm (trimers) or 715 nm (monomers), whose intensity is independent of the redox state of P700. A broad band extending from 710 to 740 nm in the absorption and fluorescence excitation spectra of trimers also indicates the existence of the longwave Chls at 295 K. The 77 K fluorescence emission of PSI trimers frozen after addition of dithionite under illumination (P700 and the PSI acceptor side reduced) shows an intense band at 760 (F760) and a smaller one at 725 nm (F725); when P700 is oxidized, the intensity of F760 decreases about 15 times. In the 77 K spectrum of monomers only F725 is present in the longwave region, and its intensity does not depend on the redox state of P700. Bands of Chls with maxima near 680, 710, and 738 nm were found in the 77 K excitation spectrum of trimers, and bands near 680 and 710 nm were seen in the spectrum of monomers. Five spectrally different red Chl forms in PSI trimers and three red Chl in monomers have been resolved by deconvolution of their 77 K absorption spectra. The difference absorption spectrum, trimers-minus-monomers, shows that the appearance of the 735 nm band in trimers is accompanied by a decrease of 708, 698, and 688 nm bands present in monomers. The reversible changes of F760 intensity of Spirulina membranes as a result of their salt treatment confirm the idea that the most longwave Chl form originates from an interaction of Chls bound to different monomeric PSI subunits forming the trimer. The time-resolved fluorescence spectra of PSI trimers and monomers, measured at 287 K in the region 680-770 nm, are substantially different, although a set of similar lifetimes (9, approximately 30, approximately 66, and 1400-2200 ps) was necessary for a good fit. No effect of P700 redox state was observed on the fluorescence kinetics of both complexes at 287 K.

MESH: Chlorophyll-metabolism; Cyanobacteria-metabolism; Energy-Transfer; Kinetics; Photosynthetic-Reaction-Center, -Bacterial-metabolism; Spectrometry, -Fluorescence

MESH: \*Chlorophyll-chemistry; \*Cyanobacteria-chemistry; \*Photosynthetic-Re

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1 of 13

TI: Solution structure of ferredoxin from the thermophilic cyanobacterium *Synechococcus elongatus* and its thermostability.  
AU: Hatanaka-H; Tanimura-R; Katoh-S; Inagaki-F  
AD: Department of Molecular Physiology, The Tokyo Metropolitan Institute of Medical Science, Bunkyo-ku, Japan.  
SO: J-Mol-Biol. 1997 May 23; 268(5): 922-33

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LA: ENGLISH

AB: The three-dimensional structure of ferredoxin, purified from the thermophilic cyanobacterium *Synechococcus elongatus*, was determined in aqueous solution by two-dimensional proton nuclear magnetic resonance. In addition to the 946 distance constraints from nuclear Overhauser effect connectivities, we added 241 distance constraints derived from the crystal structure of *Spirulina platensis* ferredoxin to the 19 residues close to the [2Fe-2S] iron-sulfur center, where crosspeaks disappeared due to paramagnetic effects. The atomic root-mean-square difference of the ten converged structures from the mean structure was 0.61(+/-0.12) Å for backbone atoms (N, C(alpha), C'). The main-chain structure was almost the same as the crystal structures of other mesophile ferredoxins, but comparison of the side-chain structures revealed an extension of the hydrophobic core, a unique hydrophobic patch on the surface of the large beta-sheet, and two unique charge networks in this thermostable ferredoxin structure, some of which might contribute to thermostability.

2 of 13

TI: [The prevalence, structure and clinical problems of multiple sclerosis in the Transcarpathian area based on epidemiological study data]  
AU: Buletsa-BA; Ihnatovych-II; Lupysh-PP; Pulyk-OR  
SO: Lik-Sprava. 1996 Oct-Dec(10-12): 163-5

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LA: UKRAINIAN; NON-ENGLISH

AB: As many as 230 patients with disseminated sclerosis were examined in the Transcarpathian region. Sick male- and female populations were found out to be almost similar. There were more sick persons in the medium-range areas of the Carpathian Mountains, with a mean age being 35 +/- 5 years. It has been established that intake of *spirulina* makes for lengthening of remission in those patients with disseminated sclerosis.

3 of 13

TI: Calcium spirulan as an inducer of tissue-type plasminogen activator in human fetal lung fibroblasts.  
AU: Hayakawa-Y; Hayashi-T; Hayashi-K; Ozawa-T; Niiya-K; Sakuragawa-N  
AD: Department of Clinical Laboratory Medicine, Faculty of Medicine, Toyama, Japan. hayakawa@ms.toyama-mpu.ac.jp  
SO: Biochim-Biophys-Acta. 1997 Mar 1; 1355(3): 241-7

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: Calcium spirulan (Ca-SP), a novel sulfated polysaccharide isolated from the blue-green alga *Spirulina platensis*, has been found to have antiviral and heparin cofactor II-dependent antithrombin activities. We have obtained evidence that Ca-SP is a potent inducer of tissue-type plasminogen activator (t-PA) production. The addition of Ca-SP to a culture of IMR-90 human fetal



lung fibroblasts increased t-PA concentrations in the conditioned medium, in a dose- and time-dependent manner, but in the cell lysate, t-PA concentrations were unchanged, suggesting that t-PA induced by Ca-SP is easily secreted into the conditioned medium. The amount of newly synthesized t-PA in IMR-90 cells, as measured by labeling with [<sup>35</sup>S]methionine and subsequent immunoprecipitation of t-PA from conditioned medium, was significantly increased by Ca-SP-stimulation. However, Ca-SP did not increase the t-PA mRNA levels. As previously reported, thrombin stimulated t-PA gene transcription in IMR-90 cells, and the simultaneous treatment with Ca-SP and thrombin caused further enhancement of t-PA production, in a synergistic manner. It would thus appear that Ca-SP increases t-PA production through post-transcriptional processes. IMR-90 cells also produce plasminogen activator inhibitor type-1 (PAI-1), but Ca-SP showed little effect on the PAI-1 production. H-SP, which was obtained by removing the calcium from Ca-SP, had no effect on the t-PA production. Na-SP, which was prepared by replacement of the calcium with sodium, stimulated the t-PA production similarly to Ca-SP. Thus, Ca-SP specifically induces t-PA production, and the molecular conformation of Ca-SP maintained by Ca or Na may be essential for the stimulation of t-PA synthesis.

4 of 13

TI: Enzyme immunoassay for phycocyanin as the main component of spirulina color in foods.

AU: Yoshida-A; Takagaki-Y; Nishimune-T

AD: Osaka Prefecture Institute of Public Health, Japan.

SO: Biosci-Biotechnol-Biochem. 1996 Jan; 60(1): 57-60

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LA: ENGLISH

AB: An enzyme immunoassay (EIA) for phycocyanin in foods was developed.

Anti-phycocyanin monoclonal antibodies were obtained from A/J mice immunized with phycocyanin. The phycocyanin in a food was extracted by dissolving the sample in a borate buffer solution, pH 8.0 (BBS) and adjusting the pH value of this solution to 8.0 with NaOH. The extract was then diluted more than 10 fold with 1% gelatin in BBS. Phycocyanin was determined by avidin-biotin sandwich EIA, using the P26-8 monoclonal antibody as the solid-phase antibody and the P277-4 monoclonal antibody as the enzyme-labeled antibody. The working range for a quantitative analysis was 100-1000 ng/ml, and the detection limit was 10 micrograms/g of the original sample. Recoveries of phycocyanin from foods by this assay were > 71% for candy, and > 66% for ice cream and sherbet.

Phycocyanin was assayed in 22 blue-, green-, purple-, and brown-colored commercial foods, and detected in one green colored-jelly at 49 micrograms/g.

5 of 13

TI: A natural sulfated polysaccharide, calcium spirulan, isolated from Spirulina platensis: in vitro and ex vivo evaluation of anti-herpes simplex virus and anti-human immunodeficiency virus activities.

AU: Hayashi-K; Hayashi-T; Kojima-I

AD: Department of Virology, Toyama Medical and Pharmaceutical University, Japan.

SO: AIDS-Res-Hum-Retroviruses. 1996 Oct 10; 12(15): 1463-71

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LA: ENGLISH

AB: A sulfated polysaccharide named calcium spirulan (Ca-SP) has been isolated from a sea alga, Spirulina platensis, as an antiviral component. The anti-human immunodeficiency virus type 1 (HIV-1) and anti-herpes simplex virus type 1 (HSV-1) activities of Ca-SP were compared with those of dextran sulfate (DS) as a representative sulfated polysaccharide. Anti-HIV-1 activities of these agents were measured by three different assays: viability of acutely infected CD4-positive cells, or a cytopathology assay; determination of HIV-1 p24 antigen released into culture supernatants; and inhibition of HIV-induced syncytium formation. Anti-HSV-1 activity was assessed by plaque yield

reduction. In addition, their effects on the blood coagulation processes and stability in the blood were evaluated. These data indicate that Ca-SF is a potent antiviral agent against both HIV-1 and HSV-1. Furthermore, Ca-SF is quite promising as an anti-HIV agent because even at low concentrations of Ca-SF an enhancement of virus-induced syncytium formation was not observed, as was observed in DS-treated cultures, Ca-SF had very low anticoagulant activity, and showed a much longer half-life in the blood of mice when compared with that of DS. Thus, Ca-SF can be a candidate agent for an anti-HIV therapeutic drug that might overcome the disadvantages observed in many sulfated polysaccharides. When the role of chelation of calcium ion with sulfate groups was examined by removing calcium or its replacement by sodium, the presence of calcium ion in the molecule was shown to be essential for the dose-dependent inhibition of cytopathic effect and syncytium formation induced by HIV-1.

6 of 13

TI: Dietary Spirulina platensis enhances humoral and cell-mediated immune functions in chickens.

AU: Qureshi-MA; Garlich-JD; Kidd-MT

AD: Department of Poultry Science, North Carolina State University, Raleigh 27695-7608, USA.

SO: Immunopharmacol-Immunotoxicol. 1996 Aug; 18(3): 465-76

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LA: ENGLISH

AB: Cornell K-strain White Leghorns and broiler chicks were raised to 7 wks and 3 wks of age respectively, with diets containing various levels (0, 10, 100, 1,000 and 10,000 ppm) of Spirulina platensis from day of hatch. Chicks in all treatment groups had comparable body weights. While bursal and splenic weights did not change, the K-strain chicks had larger thymuses ( $P < \text{or} = .05$ ) over the controls (0 ppm group). No differences were observed in anti-sheep red blood cells antibodies during primary response. However, during secondary response, K-strain chicks in all Spirulina-dietary groups had higher total anti-SRBC titers with 10,000 ppm group being the highest (6.8 Log<sub>2</sub>) versus the 0 ppm (5.5 Log<sub>2</sub>) group. In broiler chicks, a one Log increase in IgG ( $P < \text{or} = .05$ ) was observed in 10,000 ppm group over the controls. Similarly, chicks in 10,000 ppm Spirulina group had a higher PHA-P-mediated lymphoproliferative response over the 0 ppm controls. Macrophages isolated from both K-strain (10,000 ppm group) and broilers from all Spirulina groups had higher phagocytic potential than the 0 ppm groups. Spirulina supplementation at 10,000 ppm level also increased K-cell activity by two fold over the controls. These studies show that Spirulina supplementation increases several immunological functions implying that a dietary inclusion of Spirulina at a level of 10,000 ppm may enhance disease resistance potential in chickens.

7 of 13

TI: Spirulina platensis exposure enhances macrophage phagocytic function in cats.

AU: Qureshi-MA; Ali-RA

AD: Department of Poultry Science, North Carolina State University, Raleigh 27695-7608, USA.

SO: Immunopharmacol-Immunotoxicol. 1996 Aug; 18(3): 457-63

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: Bronchoalveolar lavage macrophages isolated from cats were cultured on glass coverslips. Macrophages were exposed to a water-soluble extract of Spirulina platensis in concentration range of 0 to 60 micrograms per mL for two hours. Spirulina-extract exposure did not cause significant macrophage cytotoxicity over untreated control cultures. Macrophage monolayers from treated and control cultures were incubated with sheep red blood cells (SRBC) as well as viable Escherichia coli. The percentages of phagocytic macrophages for both of these particulate antigens were higher (a two-fold increase in SRBC

phagocytosis and over 10% increase in *Escherichia coli* uptake) in cultures treated with various concentrations of Spirulina-extract. However, the numbers of either types of particles internalized by phagocytic macrophage were not different between the control and treated cultures. These data which showed that Spirulina platensis extract enhances macrophage phagocytic function imply that dietary Spirulina supplementation may improve the disease resistance potential in cats.

8 of 13

TI: Electrostatic effects in electron transfer reactions of [2Fe-2S] ferredoxins with inorganic reagents.

AU: Vidakovic-M; Germanas-JP

AD: Department of Chemistry, University of Houston, Texas 77204-5641, USA.

SO: Protein-Sci. 1996 Sep; 5(9): 1793-9

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: The kinetics of electron transfer from the reduced [2Fe-2S] ferredoxins from the cyanobacterium *Anabaena* 7120 and the protozoan *Trichomonas vaginalis* to select cobalt coordination compounds have been studied in order to gain insight into the mechanism of electron transfer and intrinsic reactivity of [2Fe-2S] active sites. With triplicative cobalt complexes, reactions of both proteins displayed saturation kinetics; values of association constants of 12,900 and 1,400 M<sup>-1</sup> and limiting rate constants of 7.6 and 3.5 s<sup>-1</sup> were found for oxidation of *T. vaginalis* and *Anabaena* ferredoxins, respectively, by Co(NH<sub>3</sub>)<sub>6</sub>(3+) at room temperature and I = 0.1 M. An activation enthalpy of 12.1 kcal/mol and activation entropy of -14.3 cal/mol K for oxidation of *T. vaginalis* ferredoxin by Co(NH<sub>3</sub>)<sub>6</sub>(3+) contrasted with corresponding values of 13.4 kcal/mol and -10.5 cal/mol K for the Spirulina platensis protein, which is homologous to *Anabaena* ferredoxin. The dependence of the reaction rates on ionic strength were measured to probe the importance of electrostatics on the reactivity of the proteins. Analysis of the ionic strength dependence of the oxidation of the proteins by Co(NH<sub>3</sub>)<sub>6</sub>(3+) by the "parallel plate" model of Watkins et al. (1994, Protein Sci 3:2104-2114) afforded values for active site charges of -0.7 and -1.1 and limiting rate constants at infinite ionic strength of 25,800 and 76 M<sup>-1</sup> s<sup>-1</sup> for *T. vaginalis* and *Anabaena* ferredoxins, respectively. These results suggest that the [2Fe-2S] center of the protozoal ferredoxin is more accessible and adjacent to a less highly charged, more compact patch of negative charges than the photosynthetic protein.

9 of 13

TI: Heparin cofactor II-dependent antithrombin activity of calcium spirulan.

AU: Hayakawa-Y; Hayashi-T; Hayashi-K; Hayashi-T; Ozawa-T; Niiya-K; Sakuragawa-N

AD: Department of Clinical Laboratory Medicine, Faculty of Medicine, Toyama Medical and Pharmaceutical University, Japan. hayakawa@ms.toyama-mpu.ac.jp

SO: Blood-Coagul-Fibrinolysis. 1996 Jul; 7(5): 554-60

LA: ENGLISH

AB: Calcium spirulan (Ca-SP), a novel sulfated polysaccharide isolated from the blue-green alga Spirulina platensis, enhanced the antithrombin activity of heparin cofactor II (HC II) more than 10000-fold. The apparent second-order rate constant of thrombin inhibition by HC II was calculated to be  $4.2 \times 10^4$  M<sup>-1</sup> min<sup>-1</sup> in the absence of Ca-SP, and it increased in the presence of 50 micrograms/ml Ca-SP to  $4.5 \times 10^8$  M<sup>-1</sup> min<sup>-1</sup>. Ca-SP effectively induced the formation of a thrombin-HC II complex in plasma. In the presence of Ca-SP, both the recombinant HC II variants Lys173-->Leu and Arg 189-->His, which are defective in interactions with heparin and dermatan sulfate, respectively, inhibited thrombin in a manner similar to native rHC II. This result indicates that the binding site of HC II for Ca-SP is different from the heparin- or dermatan sulfate-binding site. When we removed the calcium from the Ca-SP, the compound did not exert any antithrombin activity. Furthermore, Na-SP, which was prepared by replacement of the calcium in Ca-SP with sodium, accelerated the

antithrombin activity of HC II as Ca-SP did. We therefore suggest that the molecular conformation maintained by Ca or Na is indispensable to the antithrombin activity of Ca-SP. The HC II-dependent antithrombin activity of Ca-SP was almost totally abolished by treatment with chondroitinase AC I, heparinase or heparitinase, but not by treatment with chondroitinase AEC and chondroitinase AC II, suggesting that a heparin- or dermatan sulfate-like structure is not responsible for the activation of HC II by Ca-SP. Ca-SP is therefore thought to be a unique sulfated polysaccharide which shows a strong antithrombin effect in an exclusively HC II-dependent manner.

10 of 13

TI: [Pharmacology and toxicology of Spirulina alga]  
AU: Chamorro-G; Salazar-M; Favila-L; Bourges-H  
AD: Toxicología, Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional, Mexico, D.F.

SO: Rev-Invest-Clin. 1996 Sep-Oct; 48(5): 389-99  
this source is not Available in S.J.M.C.Library

LA: SPANISH; NON-ENGLISH

AB: Spirulina, a unicellular filamentous blue-green alga has been consumed by man since ancient times in Mexico and central Africa. It is currently grown in many countries by synthetic methods. Initially the interest in Spirulina was on its nutritive value; it was found almost equal to other plant proteins. More recently, some preclinical testing suggests it has several therapeutic properties such as hypocholesterolemic, immunological, antiviral and antimutagenic. This has led to more detailed evaluations such as nucleic acid content and presence of toxic metals, biogenic toxins and organic chemicals: they have shown absence or presence at tolerable levels according to the recommendations of international regulatory agencies. In animal experiments for acute, subchronic and chronic toxicity, reproduction, mutagenicity, and teratogenicity the algae did not cause body or organ toxicity. In all instances, the Spirulina administered to the animals were at much higher amounts than those expected for human consumption. On the other hand there is scant information of the effects of the algae in humans. This area needs more research.

11 of 13

TI: Toxic effects of blooms of marine species of Oscillatoriales on farmed prawns (Penaeus monodon, Penaeus japonicus) and brine shrimp (Artemia salina).

AU: Smith-PT

AD: Department of Biology, University of Western Sydney, Campbelltown, NSW, Australia.

SO: Toxicon. 1996 Aug; 34(8): 857-69  
this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: Benthic and planktonic blooms of species of Oscillatoriales coincided with mortalities of Penaeus monodon during four episodes at Australian prawn farms. Oscillatoria corakiana was the dominant planktonic species at 65-90,000 cells/ml, but Spirulina sp., Lyngbya sp., Oscillatoria sp. and Nodularia sp. were also identified from the water column, benthic layers or surface mats. The levels and variety of Vibrionaceae in prawn tissue, suggest that mortalities were caused by secondary infections of bacteria. However, experimental results indicate that toxicity of the blooms of Oscillatoriales was the primary cause of disease. Pond water and extracts from a tank culture of benthic Oscillatoriales caused mortalities when injected into P. monodon and P. japonicus. Immersion of artemia in extracts from the tank culture also caused mortalities, with LD50 values for the supernatant extract of 70 mg/litre for artemia cysts and 50 mg/litre for adult artemia, and LD50 values for the pellet extract of 110 mg/litre for artemia cysts and 200 mg/litre for adult artemia. Experiments with artemia suggested the blooms of Oscillatoriales produced water-soluble, heat-labile toxin/s. Mortalities may have been caused by a

neurotoxin because: (a) there was a lack of histopathological evidence of damage to the digestive tracts of prawns during each episode; and (b) Artemia cysts immersed in extracts of Oscillatoriales died before they developed digestive tracts. PSP toxin, anatoxin-a, homoanatoxin-a and microcystins were not detected when pond water from a diseased pond was tested. It is proposed that sub-lethal levels of toxin weakened the prawns, causing reduced feeding behaviour and an impaired immune system. As a result, prawns were prone to secondary infection by pathogenic bacteria. Because Oscillatoriales are ubiquitous in prawn farms, the findings have significant implications for the assessment of disease in the prawn farming industry.

12 of 13

TI: Calcium spirulan, an inhibitor of enveloped virus replication, from a blue-green alga Spirulina platensis.  
AU: Hayashi-T; Hayashi-K; Maeda-M; Kojima-I  
AD: Faculty of Pharmaceutical Sciences and School of Medicine, Toyama Medical and Pharmaceutical University, Toyama, Japan.  
SO: J-Nat-Prod. 1996 Jan; 59(1): 83-7

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: Bioactivity-directed fractionation of a hot H<sub>2</sub>O extract from a blue-green alga Spirulina platensis led to the isolation of a novel sulfated polysaccharide named calcium spirulan (Ca-SP) as an antiviral principle. This polysaccharide was composed of rhamnose, ribose, mannose, fructose, galactose, xylose, glucose, glucuronic acid, galacturonic acid, sulfate, and calcium. Ca-SP was found to inhibit the replication of several enveloped viruses, including Herpes simplex virus type 1, human cytomegalovirus, measles virus, mumps virus, influenza A virus, and HIV-1. It was revealed that Ca-SP selectively inhibited the penetration of virus into host cells. Retention of molecular conformation by chelation of calcium ion with sulfate groups was suggested to be indispensable to its antiviral effect.

13 of 13

TI: Composition and phase behaviour of polar lipids isolated from Spirulina maxima cells grown in a perdeuterated medium.

AU: Tropis-M; Bardou-F; Bersch-B; Daffe-M; Milon-A

AD: Laboratoire de Pharmacologie et de Toxicologie Fondamentales du CNRS, Universite Paul Sabatier, Toulouse, France.

SO: Biochim-Biophys-Acta. 1996 Oct 23; 1284(2): 196-202

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: The lipid composition of Spirulina maxima cells grown in a perdeuterated medium was determined by using nuclear magnetic resonance spectroscopy, fast atom-bombardment-mass spectrometry, gas chromatography-mass spectrometry as well as conventional chemical methods. The extent of deuteration was determined by mass spectrometry and was superior to 97.5%. The major lipids identified in the strain were: non-polar lipids (9%), monogalactosyldiacylglycerol (5%), digalactosyldiacylglycerol (22%), phosphatidylglycerol (31%), sulfoquinovosyldiacylglycerol (32%), phosphatidylinositol (traces). The major fatty acids were 16:0 (80%) and 18:1 (15%). These results demonstrate that the adaptation of the cells to D<sub>2</sub>O did not imply a profound modification of the lipid composition. The perdeuterated polar lipid mixture dispersed into an excess of water organises spontaneously in a lamellar phase as seen by <sup>31</sup>P and deuterium solid state NMR and can therefore be used to prepare perdeuterated model membranes with a well defined composition. Liposomes made using these lipids have a gel to liquid-crystalline phase transition in the range 15-27 degrees C and are in a fluid L alpha phase above this temperature. ME

MEDLINE# 9710487c12487es revealed dimer as the species

he scan rate. In the transition zone, aggregation of the dimeric species was observed. Analysis of the enzyme heated at 80 degrees C revealed that the resultant species retained a high content of secondary structure. The addition of low concentrations of guanidinium hydrochloride resulted in a full cooperative thermal transition. A model in which the dimeric protein undergoes a partial unfolding in a kinetically controlled fashion is proposed, such that the experimental value of  $\Delta H(\text{cal})$  results from the simultaneous occurrence of endothermic and exothermic events.

MESH: Calorimetry,-Differential-Scanning; Circular-Dichroism; Dimerization-; Guanidines-pharmacology; Hydrogen-Ion-Concentration; Protein-Denaturation  
MESH: \*Bacterial-Proteins-chemistry; \*Glutathione-Reductase-chemistry; \*Heat-; \*Plant-Proteins-chemistry

TG: Support,-Non-U.S.-Gov't

PT: JOURNAL-ARTICLE

RN: EC 1.6.4.2; 0; 0; 0; 0; 113-00-8

NM: Glutathione-Reductase; spirulina; Bacterial-Proteins; Guanidines;

Plant-Proteins; guanidine

AN: 97390886

UD: 9712

2 of 4

Marked in Search: #5

TI: cDNA sequence of a translational elongation factor Ts homologue from *Caenorhabditis elegans*: mitochondrial factor-specific features found in the nematode homologue peptide.

AU: Watanabe-Y; Kita-K; Ueda-T; Watanabe-K

AD: Department of Chemistry and Biotechnology, Graduate School of Engineering, the University of Tokyo, Bunkyo-ku, Japan. ywatanab@is.dal.ca

SO: *Biochim-Biophys-Acta*. 1997 Jul 17; 1353(1): 7-12

this source is not Available in S.J.M.C. Library

ISSN: 0006-3002

PY: 1997

LA: ENGLISH

CF: NETHERLANDS

AB: The cDNA for a homologue of elongation factor Ts which probably functions in mitochondria has been sequenced from a nematode *Caenorhabditis elegans*. The deduced amino acid sequence (316 amino acids long) has a possible transit peptide sequence at the amino terminus and several common specific features for mammalian mitochondrial EF-Ts. The amino acid identities in the protein from *C. elegans* compared with those of bovine mitochondria and *Escherichia coli* are 29.5% and 24.0%, respectively. The *C. elegans* sequence was classified as a long EF-Ts (ca. 280 amino acids long) similar to peptides from mammalian mitochondria and eubacteria other than *Thermus* and cyanobacteria (except *Spirulina platensis*), rather than short EF-Ts (ca. 200 amino acids long) as those of *Thermus*, cyanobacteria and plastids.

MESH: Amino-Acid-Sequence; Base-Sequence; Molecular-Sequence-Data; Sequence-Alignment

MESH: \*Caenorhabditis-elegans-genetics; \*DNA,-Complementary-genetics; \*Peptide-Elongation-Factors-genetics

TB: Animal; Support,-Non-U.S.-Gov't

PT: JOURNAL-ARTICLE

RN: 0; 0; 0

NM: elongation-factor-Ts; DNA,-Complementary; Peptide-Elongation-Factors

UN: 97398133

UD: 9710

SI: GENBANK/D87350; GENBANK/Z78198; GENBANK/M79915; GENBANK/C08917; GENBANK/L37936; GENBANK/L37935; GENBANK/V00347; GENBANK/U32719; GENBANK/X53651; GENBANK/Z74024; GENBANK/U39730; GENBANK/AE000021; GENBANK/M31161; GENBANK/U60196; GENBANK/X83598; GENBANK/D90912; GENBANK/U38804; GENBANK/X67814

3 of 4

Marked in Search: #5

TI: Effect of growth temperature on the biosynthesis of eukaryotic lipid molecular species by the cyanobacterium *Spirulina platensis*.

AU: Quoc-KP; Dubacq-JP

AD: Laboratoire de Photoregulation et Dynamique des membranes vegetales, Ecole normale superieure, Department de Biologie, CNRS URA 1810, Paris, France. kiet@otan.ens.fr

SO: Biochim-Biophys-Acta. 1997 Jun 23; 1346(3): 237-46  
this source is not Available in S.J.M.C.Library

ISSN: 0006-3002

PY: 1997

LA: ENGLISH

CP: NETHERLANDS

AB: The incorporation of linoleic acid added at mmolar concentrations to the culture medium of the photosynthetic prokaryote *Spirulina platensis* results in the synthesis of membrane glycerolipids with a eukaryotic distribution of fatty acid chain length on the glycerol backbone (Pham Quoc et al., Biochim. Biophys. Acta [1993] 1168, 94-99). This distribution contrasts with the usual prokaryotic one found in lipids of cyanobacteria. A subsequent desaturation of the exogenously supplied fatty acid resulted in a large increase of gamma-linolenic acid. In order to estimate the capacities of *S. platensis* for bioconversion of fatty acids in lipid classes, the effects of different temperatures of growth were studied in linoleic acid-supplemented cultures. The lipid composition was affected by growth temperature, the synthesis of SQDG was stimulated at low temperature. The molecular species of each lipid were isolated and analyzed. Whatever the temperature of growth, the biosynthesis of eukaryotic C18/C18 lipid molecular species was observed in all lipid classes. Furthermore, the proportion of eukaryotic lipids increased at low temperature (24 degrees C). The desaturation of C18 fatty acids at C1 and C2 positions of the glycerol moiety occurred and was further stimulated when the growth temperature was lowered. The resulting proportion of gamma-linolenic acid increased significantly in cultures supplemented with linoleate at low

temperatures. Finally a pathway for the synthesis of eukaryotic lipids and the desaturation of fatty acids esterified to the acyl lipids of linoleate-supplemented *S. platensis* can be suggested.

MESH: gamma-Linolenic-Acid-biosynthesis; Culture-Media; Cyanobacteria-growth-and-development; Diglycerides-biosynthesis; Diglycerides-chemistry; Fatty-Acids-analysis; Fatty-Acids-metabolism; Linoleic-Acids-metabolism; Lipids-chemistry; Temperature-

MESH: \*Cyanobacteria-metabolism; \*Lipids-biosynthesis

PT: JOURNAL-ARTICLE

RN: 0; 0; 0; 0; 0; 2197-37-7; 506-26-3

NM: Culture-Media; Diglycerides; Fatty-Acids; Linoleic-Acids; Lipids; linoleic-acid; gamma-Linolenic-Acid

AN: 97363615

UD: 9710

4 of 4

Marked in Search: #5

TI: Studies on electron donation to photosystem I sites by exogenous donors in Spirulina thylakoids.

AU: Kollil-BK; Sah-JF; Mohanty-P

AD: School of Life Sciences, Jawaharlal Nehru University, New Delhi, India.

JO: Indian-J-Biochem-Biophys. 1996 Dec; 33(6): 465-70

This source is Available in S.J.M.C Library

Call Number: From: 1973+

ISSN: 0301-1208

PY: 1996

LA: ENGLISH

CP: INDIA

AB: The kinetic parameters of different sites of electron donation to photosystem I (PS I) were evaluated in Spirulina platensis thylakoids. Reduced 2,6-dichlorophenolindophenol (DCIPH2) exhibited two sites of electron donation, with apparent  $K(m)$  values of 8 and 40  $\mu\text{M}$  each. The corresponding value for reduced N-tetramethyl-p-phenylenediamine (TMPDH2) and diaminodurene (DADH2) which donate electrons at a single site to PS I were 103 and 48  $\mu\text{M}$ , respectively. The electron donation by these three exogenous donors were differentially inhibited by KCN (70 mM) affecting the apparent  $K(m)$  and  $R_{\text{max}}$  values to varying extent. This cyanide inhibition of PS I catalyzed electron transport suggests the presence of plastocyanin in the photosynthetic electron transport chain of Spirulina platensis.

MESH: Chlorophyll-metabolism; Electron-Transport-drug-effects; Indicators-and-Reagents-metabolism; Kinetics-; Oxygen-Consumption-drug-effects; Phenylenediamines-metabolism; Plastocyanin-metabolism; Potassium-Cyanide-pharmacology; Spectrophotometry-;

Tetramethylphenylenediamine-metabolism; 2,6-Dichloroindophenol-metabolism

MESH: \*Cyanobacteria-metabolism; \*Photosynthetic-Reaction-Center,-Bacterial-metabolism

TG: Support,-Non-U.S.-Gov't

PT: JOURNAL-ARTICLE

RN: 0; 0; 0; 1406-65-1; 151-50-8; 27215-51-6; 3102-87-2; 479-61-8; 9014-09-9; 956-48-9

NM: Indicators-and-Reagents; Phenylenediamines;

Photosynthetic-Reaction-Center,-Bacterial; Chlorophyll; Potassium-Cyanide;

Tetramethylphenylenediamine; diaminodurene; chlorophyll-a; Plastocyanin;

2,6-Dichloroindophenol

AN: 97363065

UD: 9710



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1 of 9

TI: Effects of dietary gamma-linolenic acid on the tissue phospholipid fatty acid composition and the synthesis of eicosanoids in rats.  
AU: Guoc-KP; Pascaud-M  
AD: Laboratoire de Physiologie, Metabolique et Nutrition, Universite Pierre et Marie Curie, Paris, France.  
SO: Ann-Nutr-Metab. 1996; 40(2): 99-108

this source is not Available in S.J.M.C.Library

ISSN: 0250-6807

PY: 1996

LA: ENGLISH

CP: SWITZERLAND

AB: The purpose of this study was to evaluate the effects of different doses of dietary gamma-linolenic acid (GLA) on the tissue phospholipid fatty acid composition and the synthesis of eicosanoids in growing rats. The supplementation with different oils rich in GLA (borage oil, evening primrose oil, or Spirulina oil) and poor in n-3 polyunsaturated fatty acids or biomass of Spirulina results in a significant dose-related increase of GLA and dihomog-LA in liver, erythrocyte, and aorta phospholipids in rats fed during 6 weeks different levels of GLA. The arachidonic acid (AA)/dihomo-GLA ratios decreased with increasing intake of dietary GLA, but the AA proportions remained stable. The dietary administration of GLA increased the in vitro production by the aorta of prostaglandin E1 derived from dihomog-LA, but did not significantly influence the production of prostaglandin E2 derived from AA by the aorta and the thromboxane E2 level in serum.

MESH: gamma-Linolenic-Acid-administration-and-dosage; Alprostadiol-analysis; Aorta-metabolism; Arachidonic-Acids-analysis; Dinoprostone-analysis; Dose-Response-Relationship,-Drug; Erythrocytes-chemistry; Phospholipids-blood; Random-Allocation; Rats-; Specific-Pathogen-Free-Organisms; Thromboxane-E2-blood

MESH: \*gamma-Linolenic-Acid-pharmacology; \*Aorta-chemistry; \*Dietary-Fats,-Unsaturated-pharmacology; \*Eicosanoids-biosynthesis; \*Liver-chemistry; \*Phospholipids-analysis

IG: Animal; Male; Support,-Non-U.S.-Gov't

PT: JOURNAL-ARTICLE

RN: 0; 0; 0; 0; 363-24-6; 506-26-3; 54397-85-2; 745-65-3

NM: Arachidonic-Acids; Dietary-Fats,-Unsaturated; Eicosanoids; Phospholipids; Dinoprostone; gamma-Linolenic-Acid; Thromboxane-E2; Alprostadiol  
AN: 96369794  
UD: 9701

2 of 9

TI: Uptake by cells and photosensitizing effectiveness of novel pheophorbide derivatives in vitro.  
AU: Dagan-A; Gatt-S; Cerbu-Karabat-S; Maziere-JC; Maziere-C; Santus-R; Engelhardt-EL; Yeh-KA; Stobbe-CC; Fenning-MC; et-al  
AD: Department of Biochemistry, Hebrew University of Jerusalem, Hadassah School of Medicine, Israel.  
SO: Int-J-Cancer. 1995 Dec 11; 63(6): 831-9

this source is not Available in S.J.M.C.Library

ISSN: 0020-7136

PY: 1995

LA: ENGLISH

CP: UNITED-STATES

AB: Pheophorbide a prepared from the algae *Spirulina* was derivatized at the C(7)-carboxylic group by linking amino alkyls of various lengths and terminal functional groups. The compounds were purified by thin-layer chromatography (TLC) and by high-pressure liquid chromatography (HPLC). Solubilization of compounds by serum lipoproteins, the kinetics of compound uptake into mammalian cells, and photosensitizing effectiveness when activated by 673 nm laser light have been studied. Optimal photosensitizer uptake into cells and the greatest photosensitizing activity were observed with compounds having side-chain lengths of 4-6 carbon atoms which terminated in -OH and -CH<sub>3</sub> groups. The most effective compounds were 3 orders of magnitude more potent than Photofrin in the degree of photoactivation of cultured EMT-6 tumor cells. HDL and LDL significantly promoted the efflux of these photosensitizing drugs from cells, suggesting that their long-term retention in normal tissues in vivo would be minimal and produce little phototoxicity.

MESH: Algae-; Chlorophyll-Chemistry; Chlorophyll-chemical-synthesis; Chlorophyll-metabolism; Chromatography,-High-Pressure-Liquid; Chromatography,-Thin-Layer; Mice-; Photic-Stimulation; Photosensitizing-Agents-chemistry; Photosensitizing-Agents-chemical-synthesis; Tumor-Cells,-Cultured

MESH: \*Chlorophyll-analogs-and-derivatives; \*Lipoproteins,-HDL-metabolism; \*Lipoproteins,-LDL-metabolism; \*Photosensitizing-Agents-metabolism

TG: Animal; Human; Support,-Non-U.S.-Gov't; Support,-U.S.-Gov't,-P.H.S.

PT: JOURNAL-ARTICLE

CN: CA52102CNCI; CA06927CNCI

RN: 0; 0; 0; 1406-65-1; 15664-29-6

NM: Lipoproteins,-HDL; Lipoproteins,-LDL; Photosensitizing-Agents; Chlorophyll; pheophorbide-a

AN: 96112166

UD: 9612

3 of 9

TI: Molecular characterization of an adenylate cyclase gene of the cyanobacterium *Spirulina* platensis.

AU: Yashiro-K; Sakamoto-T; Ohmori-M

AD: Department of Biology, Graduate School of Arts and Sciences, University of Tokyo, Japan.

SO: Plant-Mol-Biol. 1996 Apr; 31(1): 175-81

~~this source is not Available in S.J.M.C.Library~~

ISSN: 0167-4412

PY: 1996

LA: ENGLISH

CP: NETHERLANDS

AB: A cyaA gene, encoding an adenylate cyclase, was isolated from a filamentous cyanobacterium, *Spirulina* platensis, by functional complementation of a cya mutant of *Escherichia coli*, defective in adenylate cyclase activity. The predicted gene product of cyaA contains a signal peptide-like domain, a putative sensor domain similar to the gene product of vsrA of *Pseudomonas solanacearum*, a putative membrane-spanning domain and an adenylate cyclase-like catalytic domain. Two other positive clones that complemented the *E. coli* mutant were isolated from the same cyanobacterium, suggesting that several cya genes are functioning in *S. platensis*.

MESH: Amino-Acid-Sequence; Base-Sequence; Cloning,-Molecular; Cyanobacteria-enzymology; Cyclic-AMP-metabolism; DNA,-Bacterial; Molecular-Sequence-Data; Sequence-Homology,-Amino-Acid; Signal-Transduction

MESH: \*Adenyl-Cyclase-genetics; \*Bacterial-Proteins-genetics; \*Cyanobacteria-genetics; \*Protein-Precursors-genetics

TG: Human; Support,-Non-U.S.-Gov't

PT: JOURNAL-ARTICLE

RN: ED 4.6.1.1; 0; 0; 0; 121889-91-6; 60-92-4  
NM: Adenyl-Cyclase; Bacterial-Proteins; DNA,-Bacterial; Protein-Precursors;  
cyclylsin; Cyclic-AMP  
AN: 96309396  
UD: 9611  
SI: GENBANK/D49530; GENBANK/D55605; GENBANK/M35096; GENBANK/M87278;  
GENBANK/L05500; GENBANK/Z35309; GENBANK/M81887

4 of 9

TI: Effect of Spirulina maxima consumption on reproduction and peri- and postnatal development in rats.  
AU: Salazar-M; Chamorro-GA; Salazar-S; Steele-CE  
AD: Department of Toxicology, National School of Biological Sciences, National Polytechnic Institute, Mexico City.  
SO: Food-Chem-Toxicol. 1996 Apr; 34(4): 353-9  
This source is not Available in S.J.M.C. Library  
ISSN: 0278-6915

PY: 1996  
LA: ENGLISH  
CP: ENGLAND

AB: Spirulina maxima, an edible micro-organism useful in human nutrition, was examined for its effect on general reproductive performance and for peri- and postnatal toxicity in rats at levels of 0, 10, 20 and 30% (w/w) incorporated into the diet. There was no reduction in body weight gain in males or females and no deaths or clinical signs of toxicity. Treatment was not associated with any adverse effect on any measure of reproductive performance, including male and female fertility and duration of gestation. There was no increase in the number of abnormal pups at caesarean section or at birth. S. maxima consumption did not result in adverse effects on developmental markers of the pups.  
MESH: Animals,-Newborn-growth-and-development; Body-Weight; Fertility-; Pregnancy-; Rats-; Rats,-Wistar  
MESH: \*Cyanobacteria-; \*Diet-adverse-effects;  
\*Prenatal-Exposure-Delayed-Effects; \*Reproduction-  
TG: Animal; Female; Male; Support,-Non-U.S.-Gov't  
PT: JOURNAL-ARTICLE  
AN: 96218047  
UD: 9609

5 of 9

TI: Purification, cDNA cloning, and regulation of lysophospholipase from rat liver.  
AU: Sugimoto-H; Hayashi-H; Yamashita-S  
AD: Department of Biochemistry, Gunma University School of Medicine, Maebashi, Japan.  
SO: J-Biol-Chem. 1996 Mar 29; 271(13): 7705-11  
This source is Available only few issues in S.J.M.C. Library  
Call Number: Frop: 1952-1993

ISSN: 0021-9258  
PY: 1996  
LA: ENGLISH  
CP: UNITED-STATES

AB: A lysophospholipase was purified 506-fold from rat liver supernatant. The preparation gave a single 24-kDa protein band on SDS-polyacrylamide gel electrophoresis. The enzyme hydrolyzed lysophosphatidylcholine, lysophosphatidylethanolamine, lysophosphatidylinositol, lysophosphatidylserine, and 1-oleoyl-2-acetyl-sn-glycero-3-phosphocholine at pH 6-8. The purified enzyme was used for the preparation of antibody and peptide sequencing. A cDNA clone was isolated by screening a rat liver lambda gt11 cDNA library with the antibody, followed by the selection of further extended clones from a lambda gt10 library. The isolated cDNA was 2,362 base pairs in length and contained an

open reading frame encoding 230 amino acids with a Mr of 24,708. The peptide sequences determined were found in the reading frame. When the cDNA was expressed in Escherichia coli cells as the beta-galactosidase fusion, lysophosphatidylcholine-hydrolyzing activity was markedly increased. The deduced amino acid sequence showed significant similarity to Pseudomonas fluorescence esterase A and Spirulina platensis esterase. The three sequences contained the GXSGX consensus at similar positions. The transcript was found in various tissues with the following order of abundance: spleen, heart, kidney, brain, lung, stomach, and testis = liver. In contrast, the enzyme protein was abundant in the following order: testis, liver, kidney, heart, stomach, lung, brain, and spleen. Thus the mRNA abundance disagreed with the level of the enzyme protein in liver, testis, and spleen. When HL-60 cells were induced to differentiate into granulocytes with dimethyl sulfoxide, the 24-kDa lysophospholipase protein increased significantly, but the mRNA abundance remained essentially unchanged. Thus a posttranscriptional control mechanism is present for the regulation of 24-kDa lysophospholipase.

MESH: beta-Galactosidase-biosynthesis; Amino-Acid-Sequence; Base-Sequence; Carboxylic-Ester-Hydrolases-chemistry; Cell-Differentiation; Chromatography,-Gel; Chromatography,-Ion-Exchange; Cloning,-Molecular; Consensus-Sequence; Cyanobacteria-enzymology; Dimethyl-Sulfoxide-pharmacology; DNA,-Complementary; Escherichia-coli; Esterases-chemistry; Gene-Expression-Regulation,-Enzymologic-drug-effects; Gene-Library; HL-60-Cells; Kinetics-; Lysophospholipase-genetics; Molecular-Sequence-Data; Open-Reading-Frames; Organ-Specificity; Pseudomonas-fluorescens-enzymology; Rats-; Rats,-Wistar; Recombinant-Fusion-Proteins-biosynthesis; Recombinant-Fusion-Proteins-isolation-and-purification; Recombinant-Fusion-Proteins-metabolism; RNA-Processing,-Post-Transcriptional; RNA,-Messenger-metabolism; Sequence-Homology,-Amino-Acid  
• MESH: \*Gene-Expression-Regulation,-Enzymologic; \*Liver-enzymology; \*Lysophospholipase-biosynthesis; \*Lysophospholipase-isolation-and-purification  
TG: Animal; Comparative-Study; Human; Male  
FT: JOURNAL-ARTICLE  
RN: EC 3.1.1.; EC 3.1.1.; EC 3.1.1.; EC 3.1.1.5; EC 3.2.1.23; 0; 0; 0; 67-68-5  
NM: Esterases; arginine-esterase; Carboxylic-Ester-Hydrolases; Lysophospholipase; beta-Galactosidase; DNA,-Complementary; Recombinant-Fusion-Proteins; RNA,-Messenger; Dimethyl-Sulfoxide  
AN: 96205961  
UD: 9609

TI: Tertiary structure of [2Fe-2S] ferredoxin from Spirulina platensis refined at 2.5 A resolution; structural comparisons of plant-type ferredoxins and an electrostatic potential analysis.  
AU: Fukuyama-K; Ueki-N; Nakamura-H; Tsukihara-T; Matsubara-H  
AD: Department of Biology, Faculty of Science, Osaka University.  
SD: J-Biochem-Tokyo. 1995 May; 117(5): 1017-23  
this source is not Available in S.J.M.C.Library

ISSN: 0021-924X  
PY: 1995  
LA: ENGLISH  
CP: JAPAN

AB: The structure of plant-type [2Fe-2S] ferredoxin isolated from Spirulina platensis has been refined using diffraction data to 2.5 A resolution by alternate cycles of simulated annealing and manual revision of the model. The final R factor is 19.9% for 2,912 reflections with  $F > 2$  sigma F between 8.0 and 2.5 A resolution. S. platensis ferredoxin, like other plant-type [2Fe-2S] ferredoxins, has a major alpha-helix flanking a sheet consisting of four beta strands. The present refinement revises the conformation of residues 56-71, in which a one-turn helix was identified. Superposition of the Spirulina ferredoxin structure on the structures of other ferredoxins that have been well

refined showed structural perturbation at a few residues on the amino and carboxyl termini and the turn between the first and second beta-strands. The root-mean-square deviations of the corresponding C alpha atoms of the pairs of ferredoxins range from 0.90 to 1.17 A for all the residues, but from 0.64 to 0.70 A if the few perturbed residues are excluded. Therefore, it may be concluded that the main-chain foldings of all the plant-type [2Fe-2S] ferredoxins are essentially the same. Electrostatic potential analysis showed that the molecular surface around the cluster is negatively charged, whereas that of the beta-sheet of the other side is positively charged. The interaction between ferredoxin and ferredoxin-NADP+ reductase is discussed on the basis of the charge distributions of these molecules and biochemical data.

MESH: Amino-Acid-Sequence; Bacterial-Proteins-chemistry; Binding-Sites;

Electrochemistry; Ferredoxin-NADP-Reductase-chemistry;

Ferredoxin-NADP-Reductase-metabolism; Ferredoxins-metabolism;

Models,-Molecular; Molecular-Sequence-Data; Plant-Proteins-chemistry

MESH: \*Crystallography,-X-Ray; \*Cyanobacteria-chemistry; .

\*Ferredoxins-chemistry; \*Protein-Structure,-Tertiary

TG: Comparative-Study

FT: JOURNAL-ARTICLE

RN: EC 1.18.1.2; 0; 0; 0

TI: Ferredoxin-NADP-Reductase; Bacterial-Proteins; Ferredoxins; Plant-Proteins

RN: 96172567

UD: 9605

7 of 9

TI: Evaluation of chemoprevention of oral cancer with Spirulina fusiformis.

AU: Mathew-B; Sankaranarayanan-R; Nair-PP; Varghese-C; Somanathan-I; Amma-BP;

Amma-NS; Nair-MK

AD: Regional Cancer Centre, Medical College Campus, Kerala, India.

SD: Nutr-Cancer. 1995; 24(2): 197-202

this source is not Available in S.J.M.C.Library

ISSN: 0163-5581

PY: 1995

LA: ENGLISH

CP: UNITED-STATES

AB: The blue-green microalgae Spirulina, used in daily diets of natives in Africa and America, have been found to be a rich natural source of proteins, carotenoids, and other micronutrients. Experimental studies in animal models have demonstrated an inhibitory effect of Spirulina algae on oral

carcinogenesis. Studies among preschool children in India have demonstrated Spirulina fusiformis (SF) to be an effective source of dietary vitamin A. We evaluated the chemopreventive activity of SF (1 g/day for 12 mos) in reversing oral leukoplakia in pan tobacco chewers in Kerala, India. Complete regression of lesions was observed in 20 of 44 (45%) evaluable subjects supplemented with SF, as opposed to 3 of 43 (7%) in the placebo arm ( $p < 0.0001$ ). When stratified by type of leukoplakia, the response was more pronounced in homogeneous lesions: complete regression was seen in 16 of 28 (57%) subjects with homogeneous leukoplakia, 2 of 8 with erythroplakia, 2 of 4 with verrucous leukoplakia, and 0 of 4 with ulcerated and nodular lesions. Within one year of discontinuing supplements, 9 of 20 (45%) complete responders with SF developed recurrent lesions. Supplementation with SF did not result in increased serum concentration of retinol or beta-carotene, nor was it associated with toxicity. This is the first human study evaluating the chemopreventive potential of SF. More studies in different settings and different populations are needed for further evaluation.

MESH: Adult-; Carotene-blood; Cyanobacteria-chemistry; Food,-Fortified; India-;

Leukoplakia,-Oral-blood; Leukoplakia,-Oral-diet-therapy; Middle-Age;

Mouth-Neoplasms-blood; Mouth-Neoplasms-diet-therapy; Remission-Induction;

Vitamin-A-analysis; Vitamin-A-blood; Vitamin-A-standards;

Vitamin-A-therapeutic-use

MESH: \*Cyanobacteria; \*Leukoplakia,-Oral-prevention-and-control;  
\*Mouth-Neoplasms-prevention-and-control  
TG: Female; Human; Male; Support,-Non-U.S.-Gov't  
PT: CLINICAL-TRIAL; JOURNAL-ARTICLE; RANDOMIZED-CONTROLLED-TRIAL  
RN: 11103-57-4; 35-88-4; 7235-40-7  
NM: Vitamin-A; Carotene; beta-carotene  
AN: 96117269  
UD: 9605

8 of 9

TI: Evidence for incorporation of intact dietary pyrimidine (but not purine) nucleosides into hepatic RNA.

AU: Berthold-HK; Crain-PF; Gouni-I; Reeds-PJ; Klein-PD

AD: Stable Isotope Laboratory, U.S. Department of Agriculture/Agricultural Research Service Children's Nutrition Research Center, Department of

Pediatrics, Baylor College of Medicine, Houston, TX 77030, USA.

SO: Proc-Natl-Acad-Sci-U-S-A. 1995 Oct 24; 92(22): 10123-7

this source is not Available in S.J.M.C.Library

ISSN: 0027-8424

PY: 1995

LA: ENGLISH

LP: UNITED-STATES

AB: The absorption and metabolism of dietary nucleic acids have received less attention than those of other organic nutrients, largely because of methodological difficulties. We supplemented the rations of poultry and mice with the edible alga *Spirulina platensis*, which had been uniformly labeled with  $^{13}\text{C}$  by hydroponic culture in  $^{13}\text{CO}_2$ . The rations were ingested by a hen for 4 wk and by four mice for 5 days; two mice were fed a normal diet and two were fed a nucleic acid-deficient diet. The animals were killed and nucleosides were isolated from hepatic RNA. The isotopic enrichment of all mass isotopomers of the nucleosides was analyzed by selected ion monitoring of the negative chemical ionization mass spectrum and the labeling pattern was deconvoluted by reference to the enrichment pattern of the tracer material. We found a distinct difference in the  $^{13}\text{C}$  enrichment pattern between pyrimidine and purine nucleosides; the isotopic enrichment of uniformly labeled  $[\text{M} + 9]$  isotopomers of pyrimidines exceeded that of purines  $[\text{M} + 10]$  by  $> 2$  orders of magnitude in the avian nuc

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1 of 12

TI: Estimates of the effect of feeding on whole-body protein degradation in women vary with the amino acid used as tracer.  
AU: Berthold-HK; Jahoor-F; Klein-PD; Reeds-FJ  
AD: USDA/ARS Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, TX 77030, USA.  
SO: J-Nutr. 1995 Oct; 125(10): 2516-27

This source is Available in S.J.M.C Library  
Call Number: From: 1969+

LA: ENGLISH

AB: We measured how feeding status affects the kinetics of multiple indispensable amino acids in four adult female subjects studied both in fed and fasted state. The subjects ingested one dose of uniformly  $^{13}C$ -labeled algae (*Spirulina platensis*). The isotopic enrichments (measured with negative chemical ionization gas chromatography-mass spectrometry) of the branched chain amino acids, phenylalanine, lysine and threonine were followed for 24 h in both the plasma and in VLDL-apolipoprotein B-100 (apoB-100). Fasting lowered body protein degradation when measured with the branched chain amino acids, increased it when measured with phenylalanine and had no statistically significant effect when determined from the kinetics of lysine and threonine. These apparent differences challenge the adequacy of current models of whole-body protein turnover. The ratio of the peak labeling of amino acids in plasma and apoB-100 was used as an estimate of the isotopic dilution in the hepatic pool. In contrast to our earlier observations during intravenous tracer amino acid administration, in the present study fasting lowered the ratio of the peak isotopic enrichments of apoB-100 and plasma amino acids. This supports our contention that feeding increases the use of hepatic portal amino acids for hepatic secretory protein synthesis.

2 of 12

TI: Sequence of the gamma-subunit of *Spirulina platensis*: a new principle of thiol modulation of FOF1 ATP synthase?

AU: Steinemann-D; Lill-H

AD: Universitat Osnabruck, Fachb, Biologie/Chemie, Abt. Biophysik, Germany.

SO: Biochim-Biophys-Acta. 1995 Jun 1; 1230(1-2): 86-90

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: The gene encoding the gamma subunit of *Spirulina platensis* FOF1, the relative of the chloroplast F1 subunit responsible for thiol activation, has been cloned and sequenced. As in other cyanobacteria, a specific couple of cysteines like those involved in thiol modulation of the chloroplast enzyme was not found. Instead, two cysteine residues were identified in the *Spirulina* subunit at positions unique amongst all so far sequenced gamma subunits. Involvement of these cysteines in the thiol-modulation of the *Spirulina* enzyme reported before (Hicks and Yocum (1986) Arch. Biochem. Biophys. 245, 230-237, and Lerma and Gomez-Lojero (1987) Photosynth. Res. 11, 265-277) would manifest a re-invention of a regulatory mechanism.

3 of 12

TI: [Inhibitive effects of *spirulina* on aberrant crypts in colon induced by dimethylhydrazine]

AU: Chen-F; Zhang-Q

AD: Hengyang Medical College, Hengyang Hunan.  
SD: Chung-Hue-Yu-Fang-I-Hsueh-Tsa-Chih. 1995 Jan; 29(1): 13-7  
this source is not Available in S.J.M.C.Library

LA: CHINESE; NON-ENGLISH

AB: Precancerous pathological changes of colon was induced by single injection in a short-term and multiple injection in a long-term intraperitoneally with 1,2-dimethylhydrazine (DMH) in NIH mice and Sprague-Dawley rats. And, protective effects of spirulina, germanium-132 and vitamin E on colon aberrant crypts induced by DMH were observed. Results showed either single injection or multiple injection with DMH could induce aberrant crypts in colon. The number of aberrant crypts scattered by short-term single injection was less than that by multiple one, and less of the aberrant crypts foci were formed by short-term single injection. Spirulina powder, germanium-132 and vitamin E all could inhibit the function of aberrant crypts of colon. In the ninth week during multiple injection with DMH, a lot of aberrant crypts of colon had been induced, and a certain amount of aberrant crypts foci had been generated. The number of aberrant crypts and aberrant crypts foci in the animals with tumor increased with the length of DMH injection. In the ninth-, 13th- and 16th-week, respectively, the number of aberrant crypts and aberrant crypts foci was significantly less in animals protected by spirulina than in positive controls ( $P < 0.01$ ), but there was no significant difference between them during 21st- and 24th-week of injections.

4 of 12

TI: A novel human hepatoblastoma cell line (HuH-6KK) with rapid growth in serum-free medium without extracellular matrix.

AU: Shinohara-K; Kong-ZL; Nagamine-K; Shiraishi-M; Murakami-H

AD: National Food Research Institute, Ibaraki, Japan.

SD: Agric-Biol-Chem. 1990 Oct; 54(10): 2599-603

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: A novel human hepatoblastoma cell line (HuH-6KK) with a high growth rate in a serum-free medium without extracellular matrix was developed from an original one, HuH-6 c15 (HuH). The original HuH cells (38 passages) did not proliferate well in RPMI 1640 medium containing 20% fetal calf serum (FCS). The HuH cells (HuH-6KK) with a high growth rate were selected by culturing them in an enriched RDF containing 20% FCS and 0.01% mucous polysaccharide (spirulina) isolated from a blue-green alga, Spirulina subsalsa. The HuH-6KK cells showed a rapid growth in serum-free eRDF medium containing insulin, transferrin, ethanalamine, and selenite (eRDF-ITES medium) without fibronectin. The proliferation of the original HuH cells was also observed in the eRDF-ITES medium, but the growth was slow compared with the HuH-6KK cells. In the medium without ITES, the growth of the HuH-6KK and original HuH cells was slow. Among the ITES ingredients, insulin promoted the growth of HuH-6KK cells the most.

5 of 12

TI: Isolation, crystallization, crystal structure analysis and refinement of allophycocyanin from the cyanobacterium Spirulina platensis at 2.3 Å resolution.

AU: Brejc-K; Ficner-R; Huber-R; Steinbacher-S

AD: Max-Planck-Institut für Biochemie, Martinsried, Germany.

SD: J-Mol-Biol. 1995 Jun 2; 249(2): 424-40

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: The phycobiliprotein allophycocyanin from the cyanobacterium Spirulina platensis has been isolated and crystallized. The crystals belong to space group  $P6(3)22$  with cell constants  $a = b = 101.9$  Å,  $c = 130.6$  Å,  $\alpha = \beta = 90$  degrees,  $\gamma = 120$  degrees, with one ( $\alpha$   $\beta$ ) monomer in the asymmetric unit. The three-dimensional structure of the ( $\alpha$   $\beta$ ) monomer was solved by multiple isomorphous replacement. The crystal structure has been



refined in a cyclic manner by energy-restrained crystallographic refinement and model building. The conventional crystallographic R-factor of the final model is 19.6% with data from 8.0 to 2.3 Å. The molecular structure of the subunits resembles other solved phycobiliprotein structures. In comparison to C-phycoerythrin and b-phycoerythrin the major differences arise from deletions and insertions of segments involved in the protein-chromophore interactions. The stereochemistry of the alpha 84 and beta 84 chiral atoms are C(2)-R, C(3)-R and C(31)-R. The configuration C(4)-Z, C(10)-Z and C(15)-Z and the conformation C(5)-anti, C(9)-syn and C(14)-anti are equal for both chromophores.

6 of 12

TI: Occurrence of inosine kinase as a distinct enzyme in Spirulina platensis.  
AU: Ipata-PL; Gualerzi-C; Scolozzi-C; Tozzi-MG; Trinei-M; Barsacchi-D  
AD: Dipartimento di Fisiologia e Biochimica, Università di Pisa, Italy.  
SO: Biochem-Biophys-Res-Commun. 1995 Apr 17; 209(2): 547-53

This source is Available only few issues in S.J.M.C. Library

LA: ENGLISH

AB: Among a series of purine nucleosides, inosine was found to be phosphorylated at the highest rate by crude extracts of the cyanobacterium Spirulina platensis. The inosine phosphorylating activity could be separated from hypoxanthine-guanine phosphoribosyl transferase. This result shows that IMP formation may occur via the direct phosphorylation of inosine at its 5'-position, rather than via inosine phosphorolysis, followed by hypoxanthine phosphoribosylation, and provides unequivocal evidence for the occurrence of inosine kinase in nature.

7 of 12

TI: Denaturing behavior of glutathione reductase from cyanobacterium Spirulina maxima in guanidine hydrochloride.

AU: Rendon-JL; Pardo-JP; Mendoza-Hernandez-G; Rojo-Dominguez-A; Hernandez-Arana-A

AD: Departamento de Bioquímica, Facultad de Medicina, Universidad Nacional Autónoma de México, México, DF.

SO: Arch-Biochem-Biophys. 1995 Apr 20; 318(2): 264-70

This source is Available only few issues in S.J.M.C. Library

LA: ENGLISH

AB: The influence of guanidine hydrochloride (Gdn-HCl) on glutathione reductase from Spirulina maxima has been studied by measuring the changes in enzymatic activity, protein fluorescence, circular dichroism, thiol groups accessibility, and gel filtration chromatography. It was found that the denaturation process involves several intermediate states. At low, Gdn-HCl concentrations ( $C_m = 0.4$  M), reductase activity was fully lost. However, below 3 M Gdn-HCl, this inhibition was freely reversible upon removal of the denaturing agent. Gel filtration experiments revealed that this reversible inhibition was not due to dissociation of the tetrameric enzyme. Structural studies strongly suggest that the conformation of this intermediate state is similar to that of native enzyme. A model in which a local region of the polypeptide chain assumes an extended conformation (D. T. Haynie, and E. Freire, Proteins 15,115-140) is proposed for the reversibly inactivated enzyme. Between 3 and 4 M Gdn-HCl ( $C_m = 3.5$ ), the enzyme activity was irreversibly lost, this inhibition being concomitant with the loss of ellipticity, changes in both wavelength and intensity at the maximum of fluorescence emission, and dissociation of the enzyme into unfolded monomers; these results reveal that gross changes in the protein conformation occur under these conditions. At 4 M Gdn-HCl an equilibrium exists between the denatured forms of dimer and monomer, which is completely shifted toward the unfolded monomers at 5 M Gdn-HCl. Irreversibility in the Gdn-HCl-induced denaturation of *S. maxima* glutathione reductase was not due to aggregation of the unfolded enzyme.

TI: Nutritional value of the alga Spirulina.  
 AU: Dillon-JC; Phuc-AP; Dubacq-JP  
 AD: Institut National Agronomique, Nutrition Humaine, Paris, France.  
 SO: World-Rev-Nutr-Diet. 1995; 77: 32-46  
this source is not Available in S.J.M.C.Library  
 LA: ENGLISH

TI: Enhancement of antibody production in mice by dietary Spirulina platensis.  
 AU: Hayashi-O; Katoh-T; Okuwaki-Y  
 AD: Department of Health and Nutrition, Kagawa Nutrition University, Sakado, Japan.  
 SO: J-Nutr-Sci-Vitaminol-Tokyo. 1994 Oct; 40(5): 431-41  
This source is Available only few issues in S.J.M.C. Library  
 LA: ENGLISH

AB: Mice fed a Spirulina platensis diet showed increased numbers of splenic antibody-producing cells in the primary immune response to sheep red blood cells (SRBC). However, immunoglobulin G (IgG)-antibody production in the secondary immune response was hardly affected. The percentage of phagocytic cells in peritoneal macrophages from the mice fed *S. platensis* diet, as well as the proliferation of spleen cells by either concanavalin A (Con A) or phytohemagglutinin (PHA) was significantly increased. Addition of a hot-water extract of *S. platensis* (SHW) to an in vitro culture of spleen cells markedly increased proliferation of these cells, whereas culture of thymus cells was scarcely affected. The Spirulina extract also significantly enhanced interleukin-1 (IL-1) production from peritoneal macrophages. Addition to the in vitro spleen cell culture of SHW as well as the supernatant of macrophages stimulated with SHW resulted in enhancement of antibody production, that is, an increase of the number of PFC. These results suggest that Spirulina enhances the immune response, particularly the primary response, by stimulating macrophage functions, phagocytosis, and IL-1 production.

TI: Electrochemical study of the redox properties of [2Fe-2S] ferredoxins. Evidence for superreduction of the Rieske [2Fe-2S] cluster.  
 AU: Verhagen-MF; Link-TA; Hagen-WR  
 AD: Department of Biochemistry, Wageningen Agricultural University, The Netherlands.  
 SO: FEBS-Lett. 1995 Mar 13; 361(1): 75-8  
this source is not Available in S.J.M.C.Library  
 LA: ENGLISH

AB: Direct, unmediated electrochemistry has been used to compare the redox properties of [2Fe-2S] clusters in spinach ferredoxin, Spirulina platensis ferredoxin and the water soluble fragment of the Rieske protein. The use of electrochemistry enabled, for the first time, the observation of the second reduction step, [Fe(III), Fe(II)] to [Fe(II), Fe(II)], in a biological [2Fe-2S] system. A water-soluble fragment of the Rieske protein from bovine heart bc1 complex exhibits two subsequent quasi-reversible responses in cyclic voltammetry on activated glassy carbon. In contrast the ferredoxins from spinach and Spirulina platensis only show one single reduction potential. These results support a seniority scheme for biological iron-sulfur clusters related cluster size to electron transfer versatility. Electrochemical reduction of spinach ferredoxin in the presence of NADP+ and ferredoxin: NADP+ oxidoreductase results in the generation of NADPH. The second order rate constant for the reaction between the ferredoxin and the reductase was estimated from cyclic voltammetry experiments to be > 3.10(5) M-1.s-1.

TI: Comparison of freeze-dried and extruded Spirulina platensis as yolk

pigmenting agents.

AU: Ross-E; Puapong-DP; Cepeda-PP; Patterson-PH

AD: Department of Animal Sciences, University of Hawaii, Honolulu 96822.

SD: Poultry-Sci. 1994 Aug; 73(8): 1282-9

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: Experiment 1 was an 8-wk study with Japanese quail fed 0, .5, 1.0, 2.0, and 4.0% of freeze-dried spirulina or the dry equivalent of fresh spirulina extruded with corn. Experiment 2 was a 16-wk repeat of Experiment 1 using levels of 0, .25, .5, 1.0, and 2.0% spirulina. In the third experiment, corn, barley, and cassava were extruded with fresh spirulina equal to 1% of the dried product, and each feedstuff fed with 1% freeze-dried spirulina. Four replicates of five quail were assigned to each treatment. Yolk color increased with increasing dietary levels of spirulina in Experiment 1. There also was a consistent increase in yolk color with freeze-dried spirulina compared with the extruded spirulina. This pattern was also seen in Experiment 2. In addition, eggs from quail fed the extruded corn control diet had markedly lower yolk scores than those from quail fed the untreated corn control diet. The mean Roche yolk color score of eggs from quail fed corn, barley, or cassava extruded with spirulina was 5.91, 3.55, and 6.70, respectively. These values were respectively 1.41, 1.89, and 4.06 units greater than the corresponding control values.

12 of 12

TI: Replacement value of blue-green alga (Spirulina platensis) for fishmeal and a vitamin-mineral premix for broiler chicks.

AU: Venkataraman-LV; Somasekaran-T; Becker-EW

AD: Plant Cell Biotechnology Department, Central Food Technological Research Institute, Mysore, India.

SD: Br-Poultry-Sci. 1994 Jul; 35(3): 373-81

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: 1. The effect of sun-dried Spirulina platensis in poultry diets was studied in a 12-week feeding trial by replacing either fishmeal (FM) or groundnut cake (GC) in a commercial diet with algae at isonitrogenous concentrations of 140 g/kg and 170 g/kg respectively. Additional vitamins/minerals were omitted from the algal diets because Spirulina is rich in them. 2. Efficiency of food utilisation, protein efficiency ratio and dressing percentage indicated that substitution of FM or GC by alga did not affect the performance of broilers. 3. None of the diets affected the weights, compositions and histopathology of the various organs of the chicks. 4. Meat quality remained unchanged except for a more intense colour in the case of birds fed on the alga-containing diets.

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1 of 5

TI: Isolation and characterization of a chlorate-resistant mutant of Spirulina platensis.

AU: Lanfaloni-L; Cappanna-E; Gualerzi-CC

AD: Institute of Cell Biology, University of Perugia, Italy.

SO: Microbiologica. 1994 Apr; 17(2): 133-40

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: Three chlorate-resistant mutants of the cyanobacterium Spirulina platensis were obtained by UV irradiation and one of them (LL1) was further characterized for its nutritional requirements and for the capacity to reduce nitrate in vivo and in vitro. The results indicate that mutation leading to chlorate resistance is not due to inactivation of nitrate reductase but is most likely due to the loss of permeability to chlorate and nitrate. The other two mutants seem to have properties similar to those of LL1.

2 of 5

TI: Cloning and characterization of the gene encoding an esterase from Spirulina platensis.

AU: Salvi-S; Trinei-M; Lanfaloni-L; Pon-CL

AD: Department of Biology MCA, University of Camerino, Italy.

SO: Mol-Gen-Genet. 1994 Apr; 243(1): 124-6

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: The gene encoding a 23 kDA serine esterase from the cyanobacterium Spirulina platensis has been identified, cloned, characterized and expressed in *Escherichia coli*. The primary structure of the esterase deduced from the DNA sequence displayed 32% sequence identity with the carboxylesterase (esterase II) encoded by estB of *Pseudomonas fluorescens*; the highest degree of homology is found in a stretch of 11 identical or highly conserved amino acid residues corresponding to the GX SXG consensus motif found in the catalytic site of many serine proteases, lipases and esterases.

3 of 5

TI: Obtaining axenic cultures of filamentous cyanobacterium Spirulina.

AU: Thacker-SP; Kothari-RM; Ramamurthy-V

AD: Thapar Institute of Engineering & Technology and Thapar Corporate Research and Development Centre Patiala, India.

SO: Biotechniques. 1994 Feb; 16(2): 216-7

this source is not Available in S.J.M.C.Library

LA: ENGLISH

4 of 5

TI: Adaptation of a strain of Spirulina platensis to grow in cobalt- and iodine-enriched media.

AU: Singh-Y; Kumar-HD

AD: Department of Botany, Banaras Hindu University, Varanasi, India.

SO: J-Appl-Bacteriol. 1994 Feb; 76(2): 149-54

this source is not Available in S.J.M.C.Library

LA: ENGLISH

AB: Cobalt- and iodide-enriched (adapted, tolerant) strains of the protein-rich cyanobacterium, Spirulina platensis, were produced by repeated sub-culturing in

increasing concentrations of the two trace elements. The strains enriched with cobalt and iodide showed higher uptake of these elements than the controls. The LD50 values for the parent and cobalt-adapted strains were 95 and 231  $\mu\text{mol l}^{-1}$   $\text{CO}_2^+$ , respectively  
SilverPlatter 3.11

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1 of 2

Marked in Search: #11

TI: Adaptation of a strain of Spirulina platensis to grow in cobalt- and iodide-enriched media.

AU: Singh-Y; Kumar-HD

AD: Department of Botany, Banaras Hindu University, Varanasi, India.

SO: J-Appl-Bacteriol. 1994 Feb; 76(2): 149-54

this source is not Available in S.J.M.C.Library

ISSN: 0021-8847

Y: 1994

LA: ENGLISH

CP: ENGLAND

AB: Cobalt- and iodide-enriched (adapted, tolerant) strains of the protein-rich cyanobacterium, Spirulina platensis, were produced by repeated sub-culturing in increasing concentrations of the two trace elements. The strains enriched with cobalt and iodide showed higher uptake of these elements than the controls. The LD50 values for the parent and cobalt-adapted strains were 95 and 231  $\mu\text{mol l}^{-1}$   $\text{CO}_2^+$ , respectively. Likewise, the LD50 values for parent and iodide-adapted strains were 12 and 42  $\text{mmol l}^{-1}$  I<sup>-</sup>. The carotenoid:chlorophyll a ratio of the parent strains increased after cobalt addition. The cobalt-adapted strain showed a much higher ratio than the cobalt-grown parent (sensitive) cells which remained unchanged after cobalt addition. Intracellular  $\text{CO}_2^+$  uptake by the cells was concentration-dependent and followed Michaelis-Menten kinetics with saturation in uptake occurring in the parent and adapted strains at 126 and 189  $\mu\text{mol l}^{-1}$   $\text{CO}_2^+$ , respectively. At saturating concentrations, the maximum  $\text{CO}_2^+$  uptake was 39.73 and 158.43  $\text{nmol CO}_2^+ \text{mg}^{-1}$  protein, respectively for the parent and adapted strains. The adapted strain also showed greater cobalt adsorption. The  $K_m$  of intracellular  $\text{CO}_2^+$  uptake was lower in the case of adapted cells as compared with the parent, whereas  $V_{\text{max}}$  showed an opposite trend. Thus, the adapted cells appear to be more efficient than the parent strain in intracellular uptake of cobalt. Differences between kinetic constants of both the strains suggest that the strains may be physiologically different. Likewise, iodide uptake was significantly higher in iodide-adapted cells than in controls.

MESH: \*Adaptation.-Physiological; \*Bacterial-Proteins-physiology;

\*Cobalt-metabolism; \*Cyanobacteria-physiology; \*Iodides-metabolism

PT: JOURNAL-ARTICLE

RN: 0; 0; 0; 7440-48-4

NM: spirulina; Bacterial-Proteins; Iodides; Cobalt

AN: 94193491

UD: 9407

2 of 2

Marked in Search: #11

TI: ESEEM studies of the iron-sulphur clusters of succinate dehydrogenase in Arum maculatum spadix mitochondrial membranes.

AU: Shergill-Jk; Cammack-R

AD: Centre for the Study of Metals in Biology and Medicine, King's College, London, UK.

SO: Biochim-Biophys-Acta. 1994 Mar 29; 1185(1): 43-9

this source is not Available in S.J.M.C.Library

ISSN: 0006-3002

PY: 1994

LA: ENGLISH

CP: NETHERLANDS

AB: We have performed ESEEM spectroscopy in order to obtain structural information about the environment of the [2Fe-2S] cluster and the [3Fe-4S] cluster of succinate dehydrogenase (Centres 1 and 3, respectively) in intact *Arum maculatum* mitochondrial membranes. Both iron-sulphur clusters showed modulations indicative of  $^{14}\text{N}$  in the three-pulse echo decay envelopes. We have estimat

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1 of 11

TI: Distribution of types of microbial mats at the Ebro Delta, Spain.

AU: Guerrero-R; Urmeneta-J; Rampone-G

AD: Department of Microbiology, University of Barcelona, Spain.

SO: Biosystems. 1993; 31(2-3): 135-44

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LA: ENGLISH

AB: The distribution and types of microbial mats of the Ebro Delta (Catalonia, Spain) are described. The studied area is La Banya spit, formed by a narrow sand bar and a peninsula, located south of the main body of the Ebro Delta. Sea water can penetrate into the back shore through channel inlets, cutting the deeper coastal barrier of the open sea side of the spit or through the complex drainage channel system of the low-energy beaches in the inner Alfacs Bay. Sea water can stay in the back shore almost permanently, trapped in isolated depressions and lagoons. The surface distribution of microbial mats in La Banya spit has been studied by means of a detailed interpretation of vertical aerial photographs and field work consisting of mapping and sampling. The observed different ratios of cyanobacteria, as well as the presence and thickness of the layers of anoxygenic sulfur phototrophic bacteria, depend on the moisture content, the system stability, and the age of the microbial mat. Lyngbya, Oscillatoria, and Spirulina are the first cyanobacteria able to colonize the bare sediment. Lyngbya dominates in young microbial mats and in mats exposed to frequent desiccation. Microcoleus is the second most important colonist in the microbial succession. In relation to water, the alternation of emergence and submergence is optimal for the maximal development of Microcoleus-dominated microbial mats. We classify the microbial mats of the Ebro Delta into five main types: (i) Lyngbya-dominated type, in which the anoxygenic phototrophic bacteria are absent and the black layer of sulfate-reducers is very thin; (ii) Spirulina-dominated type; (iii) Oscillatoria-dominated type, which is found only at one site and covers a small area--this type, like the Spirulina-type mat, is not common in the Ebro Delta; (iv) Lyngbya/Microcoleus-transition type, in which Microcoleus and Lyngbya coexist in similar proportions--in the more developed mats of this group a layer of purple bacteria is usually present, and the black layer of sulfate-reducers is usually also well developed; and (v) Microcoleus-dominated type--in La Banya spit, this type is found in localities with relatively stable conditions. These areas are wet during most of the year. After appropriate conditions of diagenesis, the most highly developed microbial mats may be preserved as laminated hard sediments. The field study has been completed with cultivation, isolation, and identification of the main cyanobacterial genera under laboratory conditions.

2 of 11

TI: Effect of inorganic phosphate on the self-associating properties of glutathione reductase from Spirulina maxima.

AU: Rendon-JL; Mendocza-Hernandez-G

AD: Departamento de Bioquímica, Facultad de Medicina, Universidad Nacional Autónoma de México, D.F. México.

SO: Biochem-Mol-Biol-Int. 1993 Nov; 31(4): 701-8

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LA: ENGLISH

AB: In the presence of millimolar concentrations of inorganic phosphate, native Spirulina maxima glutathione reductase (NAD(P)H:GSSG oxidoreductase EC

1.6.4.2.) changes its aggregation state. The oligomeric structure of the enzyme was notably dependent upon phosphate molarity, ranging from a dimer-tetramer equilibrium at relatively low phosphate concentrations into a tetramer-octamer equilibrium at moderate or high phosphate concentrations. In spite of the changes in quaternary structure, the tetramer remains as the most stable and abundant species. Sodium chloride solutions were not able to produce a similar effect, thus discarding an unspecific ionic strength effect.

3 of 11

TI: The chromosomal location of genes for elongation factor Tu and ribosomal protein S10 in the cyanobacterium Spirulina platensis provides clues to the ancestral organization of the str and S10 operons in prokaryotes.

AU: Sanangelantoni-AM; Tiboni-D

AD: Dipartimento di Genetica e Microbiologia A. Buzzati-Traverso, Universita di Pavia, Italy.

SO: J-Gen-Microbiol. 1993 Nov; 139 ( Pt 11): 2579-84

This source is Available only few issues in S.J.M.C. Library

Call Number: From1955-1977

LA: ENGLISH

AB: The structural gene (rps10) encoding ribosomal protein S10 of the cyanobacterium Spirulina platensis has been localized both on chromosomal DNA and the previously characterized recombinant plasmid pSp7 harbouring the 3'-terminal portion of the gene for elongation factor G (fus) and the gene for elongation factor Tu (tuF). Alignment of the predicted S10 sequence of S. platensis with the homologous sequences from cyanelles, bacteria, archaea and eukarya showed that the cyanobacterial S10 shares a high degree of sequence homology (74% amino acid identity) with the cyanellar protein. Unlike the situation in Escherichia coli, the rps10 gene of S. platensis is unlinked to the S10 operon genes, being adjacent to the str operon genes. Since a similar organization could be observed in cyanelles of Cyanophora paradoxa and in all archaea so far analysed, this probably represents the ancestral state.

4 of 11

TI: Trimeric forms of the photosystem I reaction center complex pre-exist in the membranes of the cyanobacterium Spirulina platensis.

AU: Shubin-VV; Tsuprun-VL; Bezsmertnaya-IN; Karapetyan-NV

AD: A.N. Bakh Institute of Biochemistry, Russian Academy of Sciences, Moscow.

SO: FEBS-Lett. 1993 Nov 8; 334(1): 79-82

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LA: ENGLISH

AB: Oligomeric and monomeric forms of chlorophyll-protein complexes of photosystem I (PSI) have been isolated from the mesophilic cyanobacterium Spirulina (1992) FEBS Lett. 309, 340-3421. Electron microscopic analysis of the complexes showed that the oligomeric form is a trimer of the shape and dimensions similar to those of the trimer from thermophilic cyanobacteria. The chlorophyll ratio in the isolated trimer and monomer was found to be 7:3. The trimeric form of PSI complex in contrast to the monomeric one contains the chlorophyll emitting at 760 nm (77K), which is also found in Spirulina membranes and therefore could be used as an intrinsic probe for the trimeric complex. The 77K circular dichroism spectrum of the trimeric form is much more similar to that of Spirulina membranes than the spectrum of the monomer. Thus, the trimeric PSI complexes exist and dominate in the Spirulina membranes.

5 of 11

TI: Iron status and growth of rats fed different dietary iron sources.

AU: Kapoor-R; Mehta-U

AD: Department of Foods and Nutrition, Haryana Agricultural University, Hisar, Haryana, India.

SO: Plant-Foods-Hum-Nutr. 1993 Jul; 44(1): 29-34

this source is not Available in S.J.M.C. Library



LA: ENGLISH

AB: The present study was carried out to investigate the availability of iron from Spirulina, whole wheat, whole egg and standard ferrous sulphate in terms of haemoglobin formation, serum and tissue iron levels. Male albino Wistar rats were first depleted of iron by giving low-iron diet (9 ppm) and bleeding 1-2 ml blood at weekly intervals for a period of 21 days. The anaemic rats were repleted with iron sources at a level of 35 ppm for 21 days. Rats receiving whole egg gained significantly ( $p < 0.01$ ) higher weight than the rest of the three groups. The increase in haemoglobin was significantly higher with ferrous sulphate than with whole wheat ( $p < 0.05$ ). Spirulina and whole egg ( $p < 0.01$ ). Feeding of ferrous sulphate, whole egg and Spirulina produced significantly higher tissue iron levels than feeding of whole wheat. Thus, availability of iron from Spirulina and whole egg were found to be comparable to that of the standard.

6 of 11

TI: Preventive effect of Spirulina maxima on the fatty liver induced by a fructose-rich diet in the rat, a preliminary report.

U: Gonzalez-de-Rivera-C; Miranda-Zamora-R; Diaz-Zagoya-JC; Juarez-Dropeza-MA

AD: Departamento de Bioquímica, Facultad de Medicina, UNAM, Mexico, D.F.

SD: Life-Sci. 1993; 53(1): 57-61

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LA: ENGLISH

AB: Cyanobacteria Spirulina maxima from Texcoco Lake in Mexico was administered as a 5% component of a purified diet, to Wistar rats together with a high percentage of fructose (60%) and its effect on several lipid fractions of plasma and liver was studied and compared to those of rats fed purified diets containing 50% of glucose or 60% of fructose. A preventive effect of Spirulina maxima on the fructose-induced increase of the liver triglycerides level was observed together with an elevation of the phospholipid concentration in this tissue. On the other hand Spirulina maxima produced a plasma cholesterol level even lower than that observed in the control group.

7 of 11

TI: On the activation mechanism of the H(+)-ATP synthase and unusual thermodynamic properties in the alkalophilic cyanobacterium Spirulina platensis.

U: Bakels-PH; van-Walraven-HS; Krab-K; Scholts-MJ; Kraayenhof-R

AD: Department of Molecular and Cellular Biology, Vrije Universiteit, Amsterdam, The Netherlands.

SD: Eur-J-Biochem. 1993 May 1; 213(3): 957-64

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Call Number: From: 1967-1975

LA: ENGLISH

AB: The activation requirements and thermodynamic characteristics of ATP synthase from the alkalophilic cyanobacterium Spirulina platensis were studied in coupled membrane vesicles. Activation by methanol increased the  $V_{max}$ , while the  $K_m$  for MgATP was unaffected (0.7 mM). We propose that in Sp. platensis, as in chloroplasts, the activating effect of methanol is based on perturbation of the gamma-epsilon subunit interaction. Light-driven ATP synthesis by membrane vesicles of Sp. platensis was stimulated by dithiothreitol. The characteristics of the activation of the ATP synthase by the proton electrochemical potential difference ( $\Delta\mu_H$ ) were analyzed on the basis of the uncoupled rates of ATP hydrolysis as a function of a previously applied proton gradient. Two values of  $\Delta\mu_H$  at which 50% of the enzyme is active, were found; 13-14 kJ.mol<sup>-1</sup> for untreated membrane vesicles, and 4-8 kJ.mol<sup>-1</sup> for light-treated and dithiothreitol-treated membrane vesicles. These values are lower than the corresponding values for the oxidized and reduced forms, respectively, of the chloroplast enzyme. Although no bulk proton gradient could be observed, membrane vesicles of Sp. platensis were able to maintain an equilibrium

phosphate potential ( $\Delta G_p$ ) of 40-43.5 kJ.mol<sup>-1</sup>, comparable to values found for *Synechococcus* 6716 and *Anabaena* 7120 membrane vesicles. Acid/base-transition experiments showed that the thermodynamic threshold,  $\Delta \mu_{H^+}$ , for ATP synthesis, catalyzed by light-treated and dithiothreitol-treated *Spirulina* membrane vesicles, was less than 5 kJ.mol<sup>-1</sup>. The activation characteristics and the low thermodynamic threshold allow ATP synthesis to occur at low  $\Delta \mu_{H^+}$  values. The findings are discussed, both with respect to differences and similarities with the enzymes from chloroplasts and other cyanobacteria, and with respect to the alkalophilic properties of *Sp. platensis*.

8 of 11

TI: Biosynthesis of eukaryotic lipid molecular species by the cyanobacterium *Spirulina* platensis.

AU: Quoc-KP; Dubacq-JP; Justin-AM; Demandre-C; Mazliak-P

AD: Laboratoire de Physiologie Cellulaire et Moléculaire, C.N.R.S., U.R.A. 1180, Université Pierre et Marie Curie, Paris, France.

SD: Biochim-Biophys-Acta. 1993 May 20; 1168(1): 94-9

this source is not Available in S.J.M.C. Library

LA: ENGLISH

AB: This report brings evidence that a prokaryotic photosynthetic organism can synthesize eukaryotic molecular species of glycerolipids. When *Spirulina* platensis PCC 8005 was supplemented with oleic acid, the sum of the percentages of 18 carbon (C18) fatty acids in monogalactosyldiacylglycerol (MGDG), the major lipid class, became largely higher than 50 mol%. This was absolutely unexpected from the well-known structure of cyanobacterial lipids. In these organisms, C18 fatty acids usually account for less than 50 mol% because they are esterified on carbon 1 of the glycerol, exclusively. This classical feature was 99% confirmed in control as well as in palmitate-supplemented cultures. The major molecular species of MGDG, which resulted from the different distributions of fatty acids on carbons 1 and 2 of glycerol, were C18/C16 type, belonging to the so-called "prokaryotic" type of lipids. By contrast, the molecular species of MGDG from oleate-supplemented cultures consisted of only 74 mol% of C18/C16 and the complementary 26 mol% were C18/C18, the so-called "eukaryotic" type of lipids. Furthermore, such C18/C18 lipids were also evidenced as traces (< 1%) in control cultures. These results underline the fact that the fatty acid specificity of 1-monoacylglycerol-3-phosphate-cyltransferase (in *Spirulina*) is not as absolute as the widely accepted concept of prokaryotic lipid would suggest. Oleate, supplemented at high concentration, can be compelled to act as a substrate for the acyltransferase and this results in the appearance of C18/C18 "eukaryotic" lipids in a prokaryotic organism.

9 of 11

TI: Effect of supplementation of blue green alga (*Spirulina*) on outcome of pregnancy in rats.

AU: Kapoor-R; Mehta-U

AD: Department of Foods and Nutrition, Haryana Agricultural University, Hisar, India.

SD: Plant-Foods-Hum-Nutr. 1993 Jan; 43(1): 29-35

this source is not Available in S.J.M.C. Library

LA: ENGLISH

AB: To study the supplementary effect of *Spirulina*, pregnant rats were fed 5 different kinds of diets (casein, *Spirulina*, wheat gluten, *Spirulina* + wheat gluten, *Spirulina* without additional vitamins and minerals), each providing 22% protein during the period of pregnancy. The outcome of pregnancy was assessed from litter and dams' weight and litter size. Maternal weight gain was found to be maximum with *Spirulina* + wheat gluten and least with the wheat gluten diet. Rats receiving *Spirulina* containing diets produced significantly ( $p < 0.05$ ) higher litter size than those receiving casein and wheat gluten. In spite of

having higher litter size, Spirulina containing diet groups produced pups with birth weights comparable to those of casein. Spirulina appears to be a good dietary supplement during pregnancy.

10 of 11

TI: Utilization of beta-carotene from Spirulina platensis by rats.

AU: Kapoor-R; Mehta-U

AD: Department of Foods & Nutrition, Haryana Agricultural University, Hisar, India.

SD: Plant-Foods-Hum-Nutr. 1993 Jan; 43(1): 1-7

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LA: ENGLISH

AB: The availability of beta-carotene from Spirulina as compared to standard all trans beta-carotene was studied by the liver and kidney vitamin A storage method. After 21 days of vitamin A depletion, the rats were repleted with beta-carotene from Spirulina and a standard source at two dietary levels (60 and 120 micrograms/day) for a 10 day period. At lower levels, the liver storage levels of vitamin A and the percent of beta-carotene absorption were comparable to those of the standard. At higher levels both these parameters of the Spirulina fed group were significantly ( $P < 0.01$ ) inferior to the standard source fed group. However, the Spirulina fed group showed better ( $P < 0.05$ ) growth than the standard fed group did at both low and high levels of feeding.

11 of 11

TI: Dietary carotenoids influenced biochemical but not morphological changes in adult male rats fed a choline-deficient diet.

AU: Jenkins-MY; Sheikh-NM; Mitchell-BV; Grundel-E; Blakely-SR; Carter-CJ

AD: Division of Nutrition, Food Safety and Applied Nutrition, U.S. Food and Drug Administration, Washington, DC 20204.

SD: Nutr-Cancer. 1993; 19(1): 55-65

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LA: ENGLISH

AB: In a study of the effects of carotenoids, canthaxanthin (CA), beta-apo-8'-carotenal (BA), or beta-carotene in an extract of Spirulina-Dunaliella algae (AE) was fed at 0%, 0.1%, or 0.2% in a choline-deficient (CD) diet. In each of eight groups, 10 adult male Fischer 344 rats were fed diets with designated carotenoid sources and levels or a choline-sufficient diet for 12 weeks. Carotenoids altered some of the changes induced by the CD diet. Increases in enlargement of fatty livers and low plasma cholesterol levels occurred in rats fed 0.2% BA. Plasma retinol was further reduced 35% by BA or AE. BA and AE increased liver total vitamin A about 80% and 305%, respectively. Liver lipid peroxidation was enhanced and plasma alpha-tocopherol was reduced further.

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Hydrogenated Fats

- **Spirulina - Production & Potential**  
by Ripley D. Fox 1988. Pub by Editions Edieud, La Calade, R N 7, 13050 Aix-en-Provence, France. Tel: 42216144; Fax: 42216520.

Tumor compounds

This book gives the most complete and practical information on growing spirulina. It should be consulted by health authorities and development decisionmakers, by spirulina growers and it can be used as a teaching text in universities. Dr. Fox explains the history of the cyanobacteria, *Arthrospira platensis*, popularly known as the blue-green algae spirulina... its composition, growth requirements and methods for managing the culture (from village level artisanal production to large scale industrial farms); health benefits are described, with emphasis on its usefulness for composting manure. Giant farms using seawater are proposed for providing spirulina as a food supplement for the millions of malnourished children living today. Dr. Fox sees spirulina as a million dollar commodity in the near future.

Coconut Oil

Unsaturated fats

Food coloring

Tumor

- **Algalculture: Spirulina, hope for a hungry world.** by Ripley D. Fox. 1988. Pub by Edieud, Aix-en-Provence, France (in French).

Spirulina

Spirulina and  
Cholesterol

- **Current knowledge on potential health benefits of spirulina.** by Amha Belay and Yoshinichi Ota 1993. Pub. in Journal of appl. Phycology, 6:235-241. USA.

Spirulina and  
Cancer

**Spirulina** is a microscopic algae, produced commercially and sold as a food supplement around the world. Until recently, interest in spirulina was mainly in its nutritive value. This is a critical review of data on therapeutic effects of Spirulina, ranging from reduction of cholesterol and cancer to enhancing the immune system, increasing intestinal lactobacilli, reducing nephrotoxicity by heavy metals and drugs, and radiation protection.

Health and Spirulina

- **Health Benefits of Spirulina.** by Denise Fox 1993. In *Spirulina, Algae of Life*, April 1993. Bulletin No 12. Pub. by Institute Océanographique, Monaco.

Diabetes and  
Spirulina

Anti viral studies and  
spirulina

- **Large scale nutritional supplementation with spirulina alga.** by C.V. Seshadri. 1993. All India Coordinated Project on Spirulina. Shri Amm Murugappa Chettiar Research Center (MCR) Madras, India.

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- **Microalgae as Food and Supplement** by Robert A. Kay, 1991. In *Critical Reviews in Food Science and Nutr.* 20(6):555-579. Pub. by CRC Press, USA.

The microalgae *Chlorella*, *Dunaliella* and *Scenedesmus*, and the cyanobacteria *Spirulina* and *Anabaena* (*Zygnema*) *lividum*, are being used as nutrient dense foods and sources of fine chemicals. They have significant amounts of lipids, proteins, chlorophyll, carotenoids, vitamins, minerals, and unique pigments. They may also have potent probiotic compounds that enhance health. Their historical and current use is reviewed.

- **Spirulina: a model for microalgae as human food**, by Alan Jessby, 1993. In *Algae and Human Affairs*, edited by Lembi and Waaland. Pub. by Cambridge Univ. Press, Cambridge, UK.

This is an evaluation of the food potential of microalgae using proven technology. Numerous examples of traditional use of algal microalgae are cited from more than 15 countries. The nutritional aspects of spirulina stand out. Spirulina's safety for human consumption, food applications, economic and environmental aspects, world spirulina production, production costs and therapeutic applications are reviewed. How microalgae can address world hunger problems is addressed with mention of harvesting wild algae and village scale production systems.

- **Spirulina, the edible organism**, by Otto Ciferri, 1993. In *Microbiological Reviews*, Dec 1993 551-578 Italy

In depth review of the history, biology, chemistry and potential of Spirulina as a human and animal food. Subjects: taxonomy, physiology, biochemistry, chemical composition, production, nutrition and toxicology, prospects for use as a food source.

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Spirulina ... Food of the Future

Based on current production figures, an acre of spirulina can produce twenty times protein than an acre of soybeans, suggesting that spirulina boasts the highest photo efficiency of any known plant. Perhaps that explains spirulina's extraordinary abi produce the richest supply of nutrients known to man.

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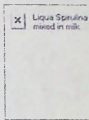
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**Directions:** Mix 1 packet with 8 fl oz of the beverage of your choice. Tastes delicious in milk!

**Ingredients:** Fructose, Deionized Water, Natural Flavors and Colors, Spirulina (2 Xanthan, Guar and Arabic Gums. Containing less than 1/10 of 1% Potassium Sorbate and Sodium Benzoate as preservatives.

**Essential Pac** - 60 servings - Item #1400, Natural Berry; Item #1401, Chocolate; Item #1402, Butternut

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Liqua Spirulina - Energy Boosting Nutrition from Nature

Page 3 of 3

Butternut, Item #1453, Mixed (Your Choice)

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URL: [http://news.ucdmc.ucdavis.edu/spirulina\\_study.html](http://news.ucdmc.ucdavis.edu/spirulina_study.html)

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## Food and Nutrition

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Anti viral studies and spirulina

## Food and Nutrition

- **Spirulina - Production & Potential** by Ripley D. Fox. 1996. Pub. by Editions Edisud, La Calade, R.N.7, 13090 Aix-en-Provence, France. Tel: 42216144; Fax: 42215620.

This book gives the most complete and practical information on growing spirulina. It should be consulted by health authorities and development decisionmakers, by spirulina growers and it can be used as a teaching text in universities. Dr. Fox explains the history of the cyanobacteria, *Arthrospira platensis*, popularly known as the blue-green algae spirulina... its composition, growth requirements and methods for managing the culture (from village level artisanal production to large scale industrial farms). Health benefits are described, with emphasis on its usefulness for combating malnutrition. Giant farms using seawater are proposed for providing spirulina as a food supplement for the millions of malnourished children living today. Dr. Fox sees spirulina as a million dollar commodity in the near future.

- **Algae culture: Spirulina, hope for a hungry world.** by Ripley D. Fox. 1966. Pub. by Edisud, Aix-en-Provence, France (in French).
- **Current knowledge on potential health benefits of spirulina.** by Amha Belay and Yoshimichi Ota. 1993. Pub. in Journal of Appl. Phycology, 5:235-241. USA.

Spirulina is a microscopic algae, produced commercially and sold as a food supplement around the world. Until recently, interest in spirulina was mainly in its nutritive value. This is a critical review of data on therapeutic effects of Spirulina, ranging from reduction of cholesterol and cancer to enhancing the immune system, increasing intestinal lactobacilli, reducing neurotoxicity by heavy metals and drugs, and radiation protection.

- **Health Benefits of Spirulina.** by Denise Fox. 1993. In *Spirulina, Algae of Life*. April 1993. Bulletin No. 12. Pub. by Institute Océanographique, Monaco.
- **Large scale nutritional supplementation with spirulina alga.** by C.V. Seshadri. 1993. All India Coordinated Project on Spirulina. Sri Amm Murugappa Chettiar Research Center (MCRC) Madras, India.

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A one year feeding program with 5,000 pre-school children showed a symptom of Vitamin A deficiency, "Bitot's spot", decreased from 80% to 10%. These rural children near Madras consumed 1 gram of spirulina a day for at least 150 days. This small amount provided the daily requirement of beta carotene (Vitamin A) which can help prevent blindness and eye diseases. In another study with 400 school children, a daily dose of beta carotene from spirulina increased their Vitamin A status to the same level as those administered pure Vitamin A. Spirulina was given to children in a unique way: extruded noodles, sweetened with sugar to preserve the beta carotene. Called "Spiru-Cm", it was well accepted by the children. This project was sponsored by the Indian Government.

- **Microalgae as Food and Supplement** by Robert A. Kay. 1991. In *Critical Reviews in Food Science and Nutr.* 30(6):555-573. Pub. by CRC Press, USA.

The microalgae chlorella, dunalialla and scenadesmus, and the cyanobacteria spirulina and spirulina are being used as nutrient dense foods and sources of fine chemicals. They have significant amounts of lipid, protein, chlorophyll, carotenoid, vitamins, minerals, and unique pigments. They may also have potent probiotic compounds that enhance health. Their historical and current use is reviewed.

- **Spirulina: a model for microalgae as human food.** by Alan Jessby. 1988. In *Algae and Human Affairs*, edited by Lembi and Waaland. Pub. by Cambridge Univ. Press, Cambridge, UK.

This is an evaluation of the food potential of microalgae using proven technology. Numerous examples of traditional use of inland microalgae are cited from more than 15 countries. The nutritional aspects of spirulina stand out. Spirulina's safety for human consumption, food applications, economic and environmental aspects, world spirulina production, production costs and therapeutic applications are reviewed. How microalgae can address world hunger problems is addressed with mention of harvesting wild algae and village scale production systems.

- **Spirulina, the edible organism.** by Orio Ciferri. 1983. In *Microbiological Reviews*, Dec 1983. 551-578. Italy.

In depth review of the history, biology, chemistry and potential of Spirulina as a human and animal food. Subj: taxonomy, physiology, biochemistry, chemical composition, production, nutrition and toxicology. prospects for use as a food source.

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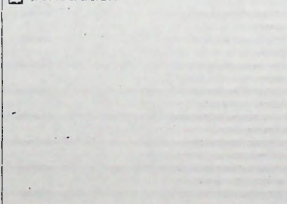
## *Spirulina*: Nutrition and Health Studies-----

by Richard Kozlenko, D.P.M., Ph.D., M.P.H.,  
and Ronald Henson

Dr. Kozlenko is a world-renowned nutritional consultant and author, founder of Wholistic Health and Nutrition Institute of Mill Valley. Mr. Henson is a vice-president of Earthrise Corporation.

[This article is reprinted with permission from the October 1996 issue of *Heal Natural Journal*.]

*Spirulina* has been gaining more and more attention from medical scientists as a nutraceutical (nutritional health-enhancing agent) and source of potential pharmaceuticals. There are several peer-reviewed scientific studies about *Spirulina*'s ability to inhibit viral replication, strengthen both the cellular and humoral arms of the immune system, and cause regression and inhibition of cancers. While these studies are preliminary and more research is needed, the results so far are exciting.



In April 1996, scientists from the Laboratory of Viral Pathogenesis, Dana-Farber Cancer Institute and Harvard Medical School, and Earthrise Farms, Calipatria, California, announced on-going research saying, "Water extract of *Spirulina platensis* inhibits HIV-1 replication in human-

derived T-cell lines and in human peripheral blood mononuclear cells. A concentration of 5-10 micrograms/ml was found to reduce viral production." HIV-1 is the AIDS virus. Small amounts of *Spirulina* extract reduced viral replication while higher concentrations totally stopped its reproduction. Importantly, with a therapeutic index of > 100, *Spirulina* extract was non-toxic to the human cells at concentrations stopping viral replication.

Another group of medical scientists has published new studies regarding

a purified water extract unique to *Spirulina* named Calcium-Spirulan. It inhibits replication of HIV-1, herpes simplex, human cytomegalovirus, influenza viruses, mumps virus, and measles virus in-vitro, yet it is very safe for human cells. It protects human and monkey cells from viral infection in cell culture. According to a peer-reviewed scientific journal report, this extract, "holds great promise for treatment of . . . HIV-1, HSV-1, and HCM infections, which is particularly advantageous for AIDS patients who are prone to these life-threatening infections."

Calcium-Spirulan is a polymerized sugar molecule containing both sulfur and calcium; it is unique to *Spirulina*. Hamsters treated with this water-soluble extract had better recovery rates when infected with an otherwise-lethal herpes virus. How does it work? When attacking a cell, a virus first attaches itself to the cell membrane. However, because of *Spirulina* extract, the virus cannot penetrate the cell membrane to infect the cell. The virus is stuck, unable to replicate. It is eventually eliminated by the body's natural defenses. *Spirulina* extracts may become useful therapeutics that could help AIDS patients lead longer, more normal lives.

*Spirulina* is a traditional food of some Mexican and African peoples. It is a planktonic blue-green algae found in alkaline, warm-water, volcanic lakes and it will adapt to a variety of saline environments. Wild *Spirulina* sustains huge flocks of flamingos in the alkaline East African Rift Valley lakes. It possesses an amazing ability to thrive in conditions much too harsh for other algae. As might be expected, it has a highly unusual nutritional profile. *Spirulina* has a 62%-amino-acid content, is the world's richest natural source of vitamin B-12, and contains a whole spectrum of natural mixed carotene and xanthophyll phytopigments. *Spirulina* has a soft cell wall made of complex sugars and rotein that is different from most other algae in that it is easily digested.

Millions of people worldwide eat *Spirulina* cultivated in scientifically designed algae farms. Current world production of *Spirulina* for human consumption is more than 1,000 metric tons annually. The United States leads world production followed by Thailand, India, and China. More countries are planning production as they realize it is a valuable strategic resource.

*Spirulina* is not *Chlorella*, nor is it the same as the blue-green algae harvested from Klamath Lake, Oregon. *Chlorella*, a green micro-alga, is a nutritious food but does not have the same anti-viral, anti-cancer, and immune-stimulating properties of *Spirulina*. The *Chlorella* cell wall is made of indigestible cellulose, like grass grown on land, while the cell wall of *Spirulina* is made of digestible complex proteins and sugars.

The Klamath Lake blue-green algae has the scientific name *Aphanizomenon flos-aquae*. There are serious concerns about the safety of eating it because it can sometimes contain potent nerve toxins. While the scientific literature is full of information concerning the toxicity of *A. flos-aquae* and its dangers to humans and animals, there are few, if any,

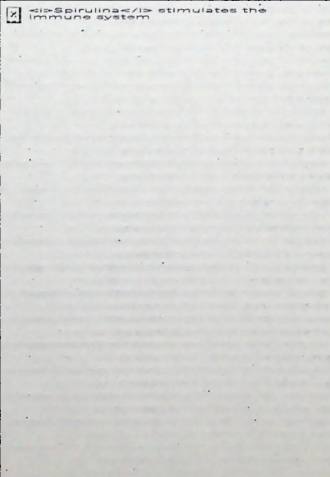
peer-reviewed scientific papers regarding therapeutic benefit. In contrast, the scientific literature is full of information concerning the benefits and safety of humans and animals eating *Chlorella* and *Spirulina*.

#### ANTI-CANCER EFFECTS

Several studies show *Spirulina* or its extracts can prevent or inhibit cancers in humans and animals. Some common forms of cancer are thought to be a result of damaged cell DNA running amok, causing uncontrolled cell growth. Cellular biologists have defined a system of special enzymes called endonucleases which repair damaged DNA to keep cells alive and healthy. When these enzymes are deactivated by radiation or toxins, errors in DNA go unrepaired, and cancer may develop.

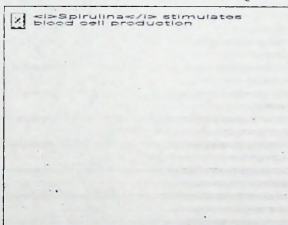
In-vitro studies suggest the unique polysaccharides of *Spirulina* enhance cell-nucleus enzyme activity and DNA-repair synthesis. This may be why several scientific studies, observing human tobacco users and experimental cancers in animals, report high levels of suppression of several important types of cancer after subjects were fed whole *Spirulina* or treated with its water extracts.

*Spirulina* is a powerful tonic for the immune system. In scientific studies of mice, hamsters, chickens, turkeys, cats, and fish, *Spirulina* consistently improves immune system function. Medical scientists find *Spirulina* not only stimulates the immune system, it actually enhances the body's ability to generate new blood cells. Important parts of the immune



system, the bone marrow stem cells, macrophages, T-cells, and natural killer cells, exhibit enhanced activity. The spleen and thymus glands show enhanced function. Scientists also observe *Spirulina* causing macrophages to increase in number, become "activated" and more effective at killing germs. Feeding studies show that even small amounts of *Spirulina* build up both the humoral and cellular arms of the immune system. *Spirulina* accelerates production of the humoral system (antibodies and cytokines), allowing it to protect against invading germs better. The cellular immune system includes T-cells, macrophages, B-cells, and the anti-cancer, natural killer cells. These cells circulate in the blood and are especially rich in organs like the liver, spleen, thymus, lymph nodes, adenoids, and bone marrow. *Spirulina* up-regulates these key cells and organs, improving their ability to function in spite of stresses from environmental toxins and infectious agents.

*Spirulina* has a dark blue-green color because it is rich in a brilliant blue polypeptide called phycocyanin. This substance affects the stem cells found in bone marrow. Stem cells are "grandmother" to both white blood



cells that make up the cellular immune system and red blood cells that oxygenate the body. Chinese scientists have documented phycocyanin as stimulating hematopoiesis (the creation of blood), emulating the effect of the hormone erythropoetin (EPO). EPO is produced by healthy kidneys and

regulates bone-marrow stem-cell production of red blood cells. Chinese scientists claim phycocyanin also regulates production of white blood cells, even when bone-marrow stem cells are damaged by toxic chemicals or radiation. Based on this effect, *Spirulina* is approved in Russia as a "medicine food" for treating radiation sickness. The children of Chernobyl suffer radiation poisoning from eating food grown on radioactive soil. Their bone marrow is damaged, rendering them immunodeficient and unable to produce normal red or white blood cells. They are anemic and suffer from terrible allergic reactions. Children fed just five grams of *Spirulina* tablets each day make dramatic recoveries within six weeks. Children not given *Spirulina* remain ill.

*Spirulina* is one of the most concentrated known natural sources of several nutritional factors. It contains all the essential amino acids, is rich in chlorophyll, beta-carotene and its co-factors, and other natural phytochemicals. *Spirulina* is the only green food rich in GLA essential fatty acid. GLA stimulates growth in some animals and makes skin and hair shiny and soft yet more durable. GLA also acts as an anti-inflammatory agent, sometimes alleviating symptoms of arthritic

conditions.

*Spirulina* acts as a functional food, feeding beneficial intestinal flora, especially *Lactobacillus* and *Bifidus*. Maintaining a healthy population of these bacteria in the intestine reduces potential problems from opportunistic pathogens like *E. coli* and *Candida albicans*. Studies show when *Spirulina* is added to the diet, beneficial intestinal flora increase.

Based on this preliminary research, scientists hope the use of *Spirulina* and its extracts may reduce or prevent cancers and viral diseases. In addition, bacterial or parasitic infections may be prevented or respond better to treatment, and wound healing may improve. Symptoms of anemia, poisoning, and immunodeficiency may be alleviated.

Scientists in the US, Japan, China, Russia, India, and other countries are studying this remarkable food to unlock its potential. More research is needed to determine its usefulness against AIDS and other killer diseases. However, it is already clear that this safe and natural food provides concentrated nutritional support for optimum health and wellness.

### References

- Aychunie, S., Belay, A., Hu, Y, Baba, T., Ruprecht, R. 7th IAAA Conference, Knysna, South Africa April 17, 1996. *Inhibition of HIV-1 replication by an aqueous extract of Spirulina platensis (Arthrospira platensis)*
- Baojiang, G., et al. Second Asia-Pacific Conference on Algal Biotechnology, April 25-27, 1994. p. 24 *Study on Effect and Mechanism of Polysaccharides of Spirulina platensis on Body Immune Functions Improvement*
- Babu, M., et al *Nutrition and Cancer* 1995. V. 24, No. 2, p.197-202. *Evaluation of Chemoprevention of Oral Cancer With Spirulina fusiformis*
- Belay, A., Ota, Y, Miyakawa, K., Shimamatsu, I., *Journal of Applied Phycology* 5:235-241, 1993. *Current knowledge on potential health benefits of Spirulina*
- Carmichael, et al. *Scientific American*, January 1995. *The Toxins of Cyanobacteria*
- Evets, L.B. et al. Grodenski, State Medical University, January 15, 1994. Russian Federation Committee of Patents and Trade, Patent Number: (19) Ru (11) 2005486 Cl (51) 5 A 6IK35/80 *Means to Normalize the levels of Immunoglobulin E Using the Food Supplement Spirulina*



Fukino, H., Takagi, Y., Yamane, Y., Eisei Kagaku 36: 5.,1990. *Effect of Spirulina (S. Platensis) on the renal toxicity induced by inorganic mercury and cisplatin*

Hayashi, T. & Hayashi, K., et al. *Journal of Natural Products* 1996. Vol. 59, No. 1, 83-87, American Chemical Society and American Society of Pharmacognosy *Calcium Spirulan, an Inhibitor of Enveloped Virus Replication, from a Blue-Green Alga Spirulina platensis*

Hayashi, K., et al. *Phytotherapy Research*, Vol. 7, 76-80, 1993. *An Extract from Spirulina platensis is a Selective Inhibitor of Herpes Simplex Virus Type 1 Penetration into HeLa Cells*

Hayashi, O., et al. *Journal of Nutritional Sciences and Vitaminology*, 40, 431-441; 1994. *Enhancement of Antibody Production in Mice by Dietary Spirulina platensis*

Kojman, A., et al. *Toxicology Letters*, 48 (1989) 165-169 Elsevier, *Radio-protective effect of extract from Spirulina platensis in mouse bone marrow cells studied by using the micronucleus test*

Lisheng, L., et al. *Marine Sciences*, Qindao China. N. 5, 1991. 33-38 *Inhibitive Effect and Mechanism of Polysaccharide of Spirulina platensis on Transplanted Tumor Cells in Mice*

Pang, Qishen., et al. *Acta Genetica Sinica (Chinese Journal of Genetics)*, V15(5) 12. 374-381, 1988. *Enhancement of Endonuclease Activity and repair DNA Synthesis by Polysaccharide of Spirulina platensis*

Qureshi, M.A., Kidd, M.T., and Ali, R.A., *Journal of Nutritional Immunology* V3(4) 1995. pages 35-45 *Spirulina platensis Extract Enhances Chicken Macrophage Functions After in vitro Exposure*

Qureshi, M.A., Ali, R.A., *Immunopharmacology and Immunotoxicology*, 1996. (submitted), *Spirulina platensis Exposure Enhances Macrophage Phagocytic Function In Cats*

Qureshi, M.A., Gartich, J.D., Kidd, M.T., *Immunopharmacology and Immunotoxicology*, 1996. (submitted), *Dietary Spirulina platensis Enhances Humoral and Cell-mediated Immune Functions In Chickens*

Zhang, C., et al. 1994. Second Asia-Pacific Conference on Alga Biotechnology, April 25-27, p.58, *The Effects of Polysaccharide and Phycocyanin from Spirulina platensis variety on Peripheral blood and Hematopoietic system of Bone Marrow in Mice*

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## Spirulina Nutrition

Scott Halbert ([thor@aslrv3.cr.usgs.gov](mailto:thor@aslrv3.cr.usgs.gov))

Thu 24 Aug 1995 20:02:35 -0600

- Messages sorted by: [ date ] [ thread ] [ subject ] [ author ]
- Next message: [dichernbieff@CCGATE.HAC.COM](mailto:dichernbieff@CCGATE.HAC.COM): "Popular Science Algae Article"
- Previous message: Deborah Hardy: "Re: Launch New Engineering Mailing List"

I've got a bottle of spirulina pills here which look to be pretty much pure compressed dried spirulina. 250 750mg pills (which cost \$21.19!)

Suggested dose (as a vitamin supplement I guess) 4 tablets daily preferably at mealtimes.

Nutritional Info: per 4 tablets

Caloriss: 11  
Protein: 2130 mg  
Crude Fiber: 27 mg  
Beta Carotene (Provitamin A) 9000 IU (180% rda)  
Vitamin B-12: 6 mcg (100% rda)  
Calcium: 12 mg (1.2% rda)  
Phosphorus: 27 mg (3% rda)  
Iron: 3 mg (16.7% rda)  
Magnesium: 14 mg (3.5% rda)  
Potassium: 46 mg

Legend: **Spirulina** is a microscopic plant organism, made directly by the interaction of sunlight and water (photosynthesis). It is the most concentrated form of any known organic food and contains 18 of the known 22 amino acids including all of the 8 essentials making it a complete protein.

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mcd is kind a a wierd unit, but that's what it says. I read that milli-candella? no?

My fresh and sea water aquaculture book doesn't tell how to grow any plants

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fmf-eng: Spirulina Nutrition

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like blue green algae, but they do mention encouraging its growth in fish rearing ponds, and say that a well managed pond will have a thick mat of such blue-green algae as *Oscillatoria*, *Lyngbya*, *Phormidium*, **Spirulina**, *Microcoleus*, *Chroococcus* and *Gomphosphaeria* as well as a list of diatoms, which I don't think we could digest very well.

For what it's worth...

---Thor



December 1, 2000

CONTACT: Carole Gau  
(916)734-9040

## UC DAVIS STUDY SHOWS SPIRULINA BOOSTS IMMUNE SYSTEM

(SACRAMENTO, Calif.) - Adding spirulina to cultured immune system cells significantly increases the production of infection fighting cytokines, say immunologists at UC Davis School of Medicine and Medical Center. Their finding is published in the Fall issue of the *Journal of Medicinal Foods*.

Spirulina are blue-green algae rich in antioxidants, vitamins, minerals and other nutrients. Used as a food supplement for more than 20 years, spirulina grows naturally in lakes with extremely high pH levels, but it is also harvested from large-scale commercial ponds, where purity is monitored before being dried and distributed in tablet and powdered form.

A number of animal studies have shown spirulina to be an effective immunomodulator (an agent that can effect the behavior of immune cells.) In rats spirulina inhibited allergic reactions by suppressing the release of histamine in a dose-dependent fashion. In cats, spirulina enhanced the ability of macrophages to engulf bacteria, and in chickens spirulina increased antibody responses and the activity of natural killer cells, which destroy infected and cancerous cells in the body.

While extensive human studies have not been done, several reports also suggest spirulina has therapeutic effects on hyperlipidemia and obesity. In one study, spirulina decreased total serum cholesterol and low-density lipoprotein cholesterol, while increasing high-density lipoprotein. A 1986 study of obese patients showed a significant reduction of body weight after including spirulina in the diet for four weeks. In the UC Davis study, researchers evaluated the secretion of the cytokines interferon-gamma, interleukin-4, and interleukin-1beta in the lab to get a better understanding of spirulina's potential regulatory effect on the immune system.

"We found that nutrient-rich spirulina is a potent inducer of interferon-gamma (13.6-fold increase) and a moderate stimulator of both interleukin-4 and interleukin-1beta (3.3-fold increase)," says Eric Gershwin, professor and chief of the Division of Rheumatology, Allergy and Clinical Immunology at UC Davis. "Together, increases in these cytokines suggest that spirulina is a strong proponent for protecting against intracellular pathogens and parasites and can potentially increase the expression of agents that stimulate inflammation, which also helps to protect the body against infectious and potentially harmful micro-organisms. Additional studies with individuals consuming spirulina are needed to determine whether these dramatic effects extend beyond the laboratory."

In the body, the preferential increase in the production of interferon-gamma over interleukin-4 would shift the immune system towards mounting a cell-mediated immune response instead of a humoral response. A cell-mediated response includes the activation of T-cells and antibodies that work with macrophages, another type of immune system cell, to engulf invading micro-organisms. Hence, spirulina's strength in protecting against intracellular pathogens and parasites. The moderate increase in the secretion of interleukin-1beta, a cytokine that acts on nearly every cell of the body to promote

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UC DAVIS STUDY SHOWS SPIRULINA BOOSTS IMMUNE SYSTEM

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inflammation, works to support the overall immune response.

To evaluate the effects of spirulina on the immune system, the UC Davis immunologists collected blood samples from 12 healthy volunteers, separating out the peripheral blood mononuclear cells. These cells, which include macrophages, monocytes, and lymphocytes, including B and T cells, work as a team to mount an immune response. The researchers incubated these cell cultures with dilutions of spirulina made from 429 mg capsules of dried, powdered spirulina from Earthrise Nutritionals, Inc. (<http://www.earthrise.com>). They added phytohemagglutinin, a known stimulator of lymphoid cells, to half of cell cultures to assess spirulina's effect on the immune system at rest and when stimulated to mount an allergic response. After 72 hours, they measured changes in cytokine levels in all samples using ELISA analysis. (ELISA, or enzyme-linked immunosorbent assay, is a sensitive technique for accurately determining the amount of protein in a given sample.)

"People have used foods like yogurt and spirulina throughout history," says Judy van de Water, associate professor of rheumatology, allergy and clinical immunology at UC Davis. "Through research, we are learning exactly how these foods improve immune system function and how they are a beneficial addition to our diet."

This research was funded in part by a grant from Earthrise Nutritionals, Inc., and the National Institutes of Health.

Copies of all news releases from UC Davis Health System are available on the web at <http://news.ucdmc.ucdavis.edu>

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TI: Inhibition of tumor invasion and metastasis by calcium spirulan (Ca-SP), a novel sulfated polysaccharide derived from a blue-green alga, Spirulina platensis.

AU: Mashima-T; Murata-J; Toyoshima-M; Fujii-H; Nakajima-M; Hayashi-T; Kato-T; Saiki-I

AD: Research Institute for Wakan-Yaku, Toyama Medical and Pharmaceutical University, Japan.

SD: Clin-Exp-Metastasis. 1998 Aug; 16(6): 541-50

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LA: ENGLISH

AB: We have investigated the effect of calcium spirulan (Ca-SP) isolated from a blue-green alga, Spirulina platensis, which is a sulfated polysaccharide chelating calcium and mainly composed of rhamnose, on invasion of B16-BL6 melanoma, Colon 26 M3.1 carcinoma and HT-1080 fibrosarcoma cells through reconstituted basement membrane (Matrigel). Ca-SP significantly inhibited the invasion of these tumor cells through Matrigel/fibronectin-coated filters. Ca-SP also inhibited the haptotactic migration of tumor cells to laminin, but it had no effect on that to fibronectin. Ca-SP prevented the adhesion of B16-BL6 cells to Matrigel and laminin substrates but did not affect the adhesion to fibronectin. The pretreatment of tumor cells with Ca-SP inhibited the adhesion to laminin, while the pretreatment of laminin substrates did not. Ca-SP had no effect on the production and activation of type IV collagenase in gelatin zymography. In contrast, Ca-SP significantly inhibited degradation of heparan sulfate by purified heparanase. The experimental lung metastasis was significantly reduced by co-injection of B16-BL6 cells with Ca-SP. Seven intermittent i.v. injections of 100 microg of Ca-SP caused a marked decrease of lung tumor colonization of B16-BL6 cells in a spontaneous lung metastasis model. These results suggest that Ca-SP, a novel sulfated polysaccharide, could reduce the lung metastasis of B16-BL6 melanoma cells, by inhibiting the tumor invasion of basement membrane probably through the prevention of the adhesion and migration of tumor cells to laminin substrate and of the heparanase activity.

2 of 19

TI: Supplementary effect of spirulina on hematological status of rats during pregnancy and lactation.

AU: Kapoor-R; Mehta-U

AD: Department of Home Science, Sri Sathya Sai Institute of Higher Learning Anantapur, Andhra Pradesh, India.

SD: Plant-Foods-Hum-Nutr. 1998; 52(4): 315-24

\_\_\_ This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: The effect of Spirulina on iron status was assessed based on hemoglobin, packed cell volume, serum iron, total iron binding capacity and ferritin levels of rats during pregnancy and lactation. Rats were fed 5 different kinds of diets (casein, Spirulina, wheat gluten, Spirulina + wheat gluten, Spirulina without additional vitamins and minerals) each providing 22 percent protein. Diets containing Spirulina alone or in combination with wheat gluten resulted in significantly higher iron storage and hemoglobin contents than casein and wheat gluten diets during the first half of pregnancy and lactation. Wheat

gluten diet result in the smallest increase in hemoglobin levels and iron stores compared to other diets. The values of serum iron and iron binding capacity remained unchanged with different diets. Spirulina appears to be effective in improving the iron status of rats during pregnancy and lactation.

3 of 19

TI: Organization and role of the long-wave chlorophylls in the photosystem I of the Cyanobacterium spirulina.

AU: Karapetyan-NV

AD: Bakh Institute of Biochemistry, Russian Academy of Sciences, Moscow.

inbio@glas.acp.org

SO: Membr-Cell-Biol. 1998; 12(5): 571-84

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LA: ENGLISH

AB: The data on the organization and function of the photosystem I pigment-protein complexes of the cyanobacterium Spirulina and the characteristics of pigment antenna of the photosystem I monomeric and trimeric core complexes are presented and discussed. We proved that the photosystem I complexes in the cyanobacterial membrane pre-exist mainly as trimers, though both types of complexes contribute to the photosynthetic electron transport. In contrast to monomers, the antenna of the photosystem I trimeric complexes of Spirulina contains the extreme long-wave chlorophyll form absorbing at 735 nm and emitting at 760 nm (77 K). The intensity of fluorescence at 760 nm depends strongly on the P700 redox state: it is maximum with the reduced P700 and strongly decreased with the oxidized P700 which is the most efficient quencher of fluorescence at 760 nm. The energy absorbed by the extreme long-wave chlorophyll form is active in the photooxidation of P700 in the trimeric complex. The data obtained indicate that the long-wave form of chlorophyll originates from interaction of the chlorophyll molecules localized on monomeric subunits forming the photosystem I trimer. Kinetic analysis of the P700 photooxidation and light-induced quenching of fluorescence at 760 nm (77 K) allows the suggestion that the excess energy absorbed by the antenna monomeric subunits within the trimer migrates via the extreme long-wave chlorophyll to the P700 cation radical and is quenched, which prevents the photodestruction of the pigment-protein complex.

4 of 19

TI: Class specific influence of dietary Spirulina platensis on antibody production in mice.

AU: Hayashi-G; Hiraishi-T; Kato-T; Miyajima-H; Hirano-T; Okuwaki-Y

AD: Department of Health and Nutrition, Kagawa Nutrition University, Sakado, Japan.

SO: J-Nutr-Sci-Vitaminol-Tokyo. 1998 Dec; 44(6): 841-51

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Call Number: from 1974-1986

LA: ENGLISH

AB: In the present study, we investigated antibody productions of IgA and other classes, such as IgE and IgG1, in mice as possible evidence of the protective effects of Spirulina toward food allergy and microbial infection. An increase of IgE antibody level in the serum was observed in the mice that were orally immunized with crude shrimp extract as an antigen (Ag group). The antibody level, however, was not further enhanced by treatment with Spirulina extract (SPHW). IgG1 antibody, on the other hand, which was increased by antigen administration, was further enhanced by Spirulina extract. It was noted that the IgA antibody level in the intestinal contents was significantly enhanced by treatment with Spirulina extract concurrently ingested with shrimp antigen, in comparison with that of the Ag group treated with shrimp antigen alone. An enhancement of IgA antibody production by Spirulina extract was also observed in culture supernatant of lymphoid cells, especially in the spleen and

mesenteric lymph node from mice treated with Spirulina extract for 4 weeks before antigen stimulation. These results suggest that Spirulina may at least neither induce nor enhance allergic reaction such as food allergy dependent on an IgE antibody, and that when ingested both concurrently with antigen and before antigen stimulation, it may significantly enhance the IgA antibody level to protect against allergic reaction.

5 of 19

TI: Subchronic toxicity study in mice fed Spirulina maxima.  
AU: Salazar-H; Martinez-E; Madrigal-E; Ruiz-LF; Chamorro-GA  
AD: Departamento de Toxicología, Escuela Nacional de Ciencias Biológicas (I.P.N.), Mexico D.F., Mexico.  
SO: J-Ethnopharmacol. 1978 Oct; 62(3): 235-41

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LA: ENGLISH

AB: The purpose of this study was to evaluate the toxicity of Spirulina maxima, a blue-green alga used as food supplement and food coloring, after 13 weeks of treatment. Groups of ten mice of each sex were given S. maxima in the diet at concentrations of 0 (control), 10, 20 or 30% (w/w) for 13 weeks. The alga ingestion had no effect on behavior, food and water intake, growth or survival. Terminal values in hematology and clinical chemistry did not reveal differences between treated and control groups. However, male and female mice showed significant changes in serum cholesterol levels at 20 and 30% algal concentrations, but a toxic effect of S. maxima was excluded. Post-mortem examination revealed no differences in gross or microscopic findings. Our results show that S. maxima up to high feeding levels did not produce adverse effects in mice after subchronic treatment.

6 of 19

TI: Lactic acid bacteria growth promoters from Spirulina platensis.  
AU: Parada-JL; Zulpa-de-Caire-G; Zaccaro-de-Mula-NC; Storni-de-Cano-AM  
AD: Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Pab. II, Argentina.  
SO: Int-J-Food-Microbiol. 1978 Dec 22; 45(3): 225-8

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Spirulina has been used for many years as human food because of its high protein content and nutritional value. Some strains also produce bioactive substances that may inhibit or promote microbial growth. Lactococcus lactis, Streptococcus thermophilus, Lactobacillus casei, Lactobacillus acidophilus, and Lactobacillus bulgaricus were grown in rich media, MRS and RM, as well as in minimal saline medium with and without addition of extracellular products obtained from a late log phase culture of Spirulina platensis in Zarrouk medium. In both MRS and RM media, the extracellular products significantly promote the growth of the lactic acid bacteria assayed. This stimulatory effect was observed in media with pH adjusted to 5.3, 6.3 and 7.0. No effect was observed in minimal saline medium.

7 of 19

TI: Antioxidant activity of the microalga Spirulina maxima.  
AU: Miranda-MS; Cintra-RG; Barros-SB; Mancini-Filho-J  
AD: Faculdade de Farmácia e Bioquímica, Universidade Federal da Bahia, Salvador, Brasil.  
SO: Braz-J-Med-Biol-Res. 1978 Aug; 31(8): 1075-9

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Spirulina maxima, which is used as a food additive, is a microalga rich in protein and other essential nutrients. Spirulina contains phenolic acids, tocopherols and beta-carotene which are known to exhibit antioxidant

properties. The aim of the present study was to evaluate the antioxidant capacity of a Spirulina extract. The antioxidant activity of a methanolic extract of Spirulina was determined in vitro and in vivo. The in vitro antioxidant capacity was tested on a brain homogenate incubated with and without the extract at 37 degrees C. The IC50 (concentration which causes a 50% reduction of oxidation) of the extract in this system was 0.18 mg/ml. The in vivo antioxidant capacity was evaluated in plasma and liver of animals receiving a daily dose of 3 mg for 2 and 7 weeks. Plasma antioxidant capacity was measured in brain homogenate incubated for 1 h at 37 degrees C. The production of oxidized compounds in liver after 2 h of incubation at 37 degrees C was measured in terms of thiobarbituric acid reactant substances (TBARS) in control and experimental groups. Upon treatment, the antioxidant capacity of plasma was 71% for the experimental group and 54% for the control group. Data from liver spontaneous peroxidation studies were not significantly different between groups. The amounts of phenolic acids, alpha-tocopherol and beta-carotene were determined in Spirulina extracts. The results obtained indicate that Spirulina provides some antioxidant protection for both in vitro and in vivo systems.

8 of 19

TI: Coevolution of actin and associated proteins: an alpha-actinin-like protein in a cyanobacterium (Spirulina platensis).

AU: Usmanova-A; Astier-C; Kejean-C; Hubert-F; Feinberg-J; Benyamin-Y; Roustan-C

AD: UMR 5539 (CNRS), Université de Montpellier 2, France.

SD: Comp-Biochem-Physiol-B-Biochem-Mol-Biol. 1998 Aug; 120(4): 693-700

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Actin, together with associated proteins, such as myosin, cross-linking or capping proteins, has been observed in all eukaryotic cells. Presence of actin or actin-like proteins has also been reported in prokaryotic organisms belonging to the cyanobacteria. Our aim was first to extend the characterization of an actin-like protein to another prokaryotic cell, i.e. Spirulina, then to compare the antigenic reactivity of this new protein with that of *Synechocystis* and skeletal actins. We observed that some of the conserved antigenic epitopes corresponded to actin regions known to interact with cross-linking proteins. We also report for the first time that alpha-actinin and filamin purified from chicken gizzard both interact with a prokaryotic actin-like protein. Finally, we searched for the occurrence of a cross-linking protein in these cyanobacteria and identified a 105-kDa protein as an alpha-actinin-like protein using specific antibodies.

9 of 19

TI: Further purification and structural analysis of calcium spirulan from Spirulina platensis.

AU: Lee-JB; Hayashi-T; Hayashi-K; Sankawa-U; Maeda-M; Nemoto-T; Nakanishi-H

AD: Faculty of Pharmaceutical Sciences and School of Medicine, Toyama Medical and Pharmaceutical University, 2630 Sugitani, Toyama 930-0194, Japan.

SD: J-Nat-Prod. 1998 Sep; 61(9): 1101-4

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: An antiviral sulfated polysaccharide, calcium spirulan (Ca-SP), isolated from Spirulina platensis, was subjected to further purification. Ca-SP was found to be composed of rhamnose, 3-O-methylrhamnose (acofriose), 2,3-di-O-methylrhamnose, 3-O-methylxylose, uronic acids, and sulfate. The backbone of Ca-SP consisted of 1,3-linked rhamnose and 1,2-linked 3-O-methylrhamnose units with some sulfate substitution at the 4-position. The polymer was terminated at the nonreducing end by 2,3-di-O-methylrhamnose and 3-O-methylxylose residues.



TI: News & notes. Efficient library construction with a TA vector and its application to cloning of the phytoene synthase gene from the cyanobacterium *Spirulina platensis*.

AU: Kawata-Y; Yano-S; Kojima-H

AD: Osaka National Research Institute, Agency of Industrial Science and Technology, Ikeda, Osaka 563, Japan.

SO: Curr-Microbiol. 1978 Oct; 37(4): 289-91

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LA: ENGLISH

AB: An efficient and simple method for constructing a genomic DNA library is presented by use of a TA cloning vector. It is based on sonication cleavage of genomic DNA and modification of the fragment ends with Taq DNA polymerase, followed by ligation with a TA vector. This method was successfully applied to cloning of the phytoene synthase gene crtB from *Spirulina platensis*. The method is useful when the genomic DNA is not well digested with restriction enzymes owing to methylation or other reasons.

TI: Hepatoprotective effect of C-phycoerythrin: protection for carbon tetrachloride and R-(+)-pulegone-mediated hepatotoxicity in rats.

AU: Madiraja-BB; Gaikwad-NM; Madyastha-KM

AD: Department of Organic Chemistry, Indian Institute of Science, Bangalore, 560 012, India.

SO: Biochem-Biophys-Res-Commun. 1978 Aug 19; 249(2): 428-31

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Effect of C-phycoerythrin (from *Spirulina platensis*) pretreatment on carbon tetrachloride and R-(+)-pulegone-induced hepatotoxicity in rats was studied. Intraperitoneal (i.p.) administration (200 mg/kg) of a single dose of phycoerythrin to rats, one or three hours prior to R-(+)-pulegone (250 mg/kg) or carbon tetrachloride (0.6 ml/kg) challenge, significantly reduced the hepatotoxicity caused by these chemicals. For instance, serum glutamate pyruvate transaminase (SGPT) activity was almost equal to control values. The losses of microsomal cytochrome P450, glucose-6-phosphatase and aminopyrine-N-demethylase were significantly reduced, suggesting that phycoerythrin provides protection to liver enzymes. It was noticed that the level of menthofuran, the proximate toxin of R-(+)-pulegone was nearly 70% more in the urine samples collected from rats treated with R-(+)-pulegone alone than rats treated with the combination of phycoerythrin and R-(+)-pulegone. The possible mechanism involved in the hepatoprotection is discussed. Copyright 1978 Academic Press.

TI: Ultraviolet-B effects on *Spirulina platensis* cells: modification of chromophore-protein interaction and energy transfer characteristics of phycobilisomes.

AU: Rajagopal-S; Jha-IB; Murthy-GD; Mohanty-P

AD: Department of Chemistry, Sri Venkateswara University, Tirupati, India.

SO: Biochem-Biophys-Res-Commun. 1978 Aug 10; 249(1): 172-7

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Exposure of ultraviolet-B (280-320 nm, 1.9 mW m<sup>-2</sup> s<sup>-1</sup>) radiation of intact *Spirulina platensis* for 9 h caused specific loss of the 85.5 KDa anchor protein of phycobilisomes, the major light-harvesting antenna complex of photosystem II. Associated with the loss of 85.5 KDa protein, the UV-B irradiation also caused photobleaching of phycobilins and alteration in the chromophore protein interactions, as evidenced from the visible circular dichroic measurements, and it also affected the energy transfer process within the phycobilisomes, as

inferred from the low-temperature, 77 K, fluorescence spectral analysis. Our results, thus, clearly demonstrate for the first time that the phycobilisomes effectively act as targets for UV-B induced damage of photosynthetic apparatus in cyanobacteria.

13 of 19

TI: Photostable chlorophyll a conjugated with poly(vinylpyrrolidone)-smectite catalyzes photoreduction and hydrogen gas evolution by visible light.  
AU: Itoh-T; Ishii-A; Kodera-Y; Matsushima-A; Hiroto-H; Nishimura-H; Tsuzuki-T; Kamachi-T; Okura-I; Inada-Y

AD: Toin Human Science and Technology Center, Department of Materials Science and Technology, Toin University of Yokohama, Japan.

SO: Bioconj-Chem. 1998 May-Jun; 9(3): 409-12

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Chlorophyll a was adsorbed to a synthetic smectite intercalated by poly(vinylpyrrolidone) (PVP) to form the chlorophyll-PVP-smectite conjugate (Chl-PVP-SME) having an absorption maximum at 677 nm. The conjugate was found to be stable toward light illumination in comparison with chlorophyll-smectite, chlorophyll-PVP, and free chlorophyll a. Chl-PVP-SME had a photoinduced activity for catalyzing the reduction of methyl viologen. Furthermore, the evolution of hydrogen gas was observed when an aqueous suspension containing Chl-PVP-SME, methyl viologen (an electron carrier), 2-mercaptoethanol (an electron donor), and hydrogenase was illuminated by visible light.

14 of 19

TI: Spirulina maxima prevents induction of fatty liver by carbon tetrachloride in the rat.

AU: Torres-Duran-PV; Miranda-Zamora-R; Paredes-Carbajal-MC; Mascher-D;

Diaz-Zagoya-JC; Juarez-Dropeza-MA

AD: Departamento de Bioquímica, UNAM, Mexico, D.F., Mexico.

SO: Biochem-Mol-Biol-Int. 1998 Apr; 44(4): 787-93

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: The aim of the present work was to assess the capacity of Spirulina maxima to prevent fatty liver development induced in rats by an intraperitoneal single dose (1 ml/kg) of carbon tetrachloride. Liver and serum lipids were quantified two or four days after treatment with this agent. Liver lipid concentration did not differ in rats fed on a purified diet with or without Spirulina. However, after carbon tetrachloride treatment, liver triacylglycerols were significantly lower in rats fed on a diet with Spirulina 5% than in rats without Spirulina in their diet ( $P < 0.05$ ). Furthermore, the increased liver cholesterol values, induced by carbon tetrachloride treatment, were not observed in rats that received Spirulina. These results support the potential hepatoprotective role of Spirulina.

15 of 19

TI: Inhibitory effect of mast cell-mediated immediate-type allergic reactions in rats by spirulina.

AU: Kim-HM; Lee-EH; Cho-HH; Moon-YH

AD: Department of Oriental Pharmacy, College of Pharmacy, Wonkwang University, Iksan, Chonbuk, South Korea. hmkim@med.wonkwang.ac.kr

SO: Biochem-Pharmacol. 1998 Apr 1; 55(7): 1071-6

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LA: ENGLISH

AB: We investigated the effect of spirulina on mast cell-mediated immediate-type allergic reactions. Spirulina dose-dependently inhibited the systemic allergic reaction induced by compound 48/80 in rats. Spirulina inhibited compound 48/80-induced allergic reaction 100% with doses of 100-1000

microg/g body weight, i.p. Spirulina (10-1000 microg/g body weight, i.p.) also significantly inhibited local allergic reaction activated by anti-dinitrophenyl (DNP) IgE. When rats were pretreated with spirulina at a concentration ranging from 0.01 to 1000 microg/g body weight, i.p., the serum histamine levels were reduced in a dose-dependent manner. Spirulina (0.001 to 10 microg/mL) dose-dependently inhibited histamine release from rat peritoneal mast cells (RPMC) activated by compound 48/80 or anti-DNP IgE. The level of cyclic AMP in RPMC, when spirulina (10 microg/mL) was added, transiently and significantly increased about 70-fold at 10 sec compared with that of control cells. Moreover, spirulina (10 microg/mL) had a significant inhibitory effect on anti-DNP IgE-induced tumor necrosis factor-alpha production. These results indicate that spirulina inhibits mast cell-mediated immediate-type allergic reactions *in vivo* and *in vitro*.

16 of 19

TI: Inhibition of HIV-1 replication by an aqueous extract of Spirulina platensis (Arthrospira platensis).  
AU: Ayeheunis-S; Belay-A; Baba-TW; Ruprecht-RM  
AD: Laboratory of Viral Pathogenesis, Dana-Farber Cancer Institute, and Harvard Medical School, Boston, Massachusetts 02115, USA.  
SO: J-Acquir-Immune-Defic-Syndr-Hum-Retrovirol. 1998 May 1; 18(1): 7-12  
This source is not available in the S.J.M.C. Library.

LA: ENGLISH

AB: An aqueous extract of the blue-green filamentous algae Arthrospira platensis (previously called Spirulina platensis) inhibited HIV-1 replication in human T-cell lines, peripheral blood mononuclear cells (PBMC), and Langerhans cells (LC). Extract concentrations ranging between 0.3 and 1.2 microg/ml reduced viral production by approximately 50% (50% effective concentration [EC50]) in PBMCs. The 50% inhibitory concentration (IC50) of extract for PBMC growth ranged between 0.8 and 3.1 mg/ml. Depending on the cell type used, therapeutic indices ranged between 200 and 6000. The extract inactivated HIV-1 infectivity directly when preincubated with virus before addition to human T-cell lines. Fractionation of the extract revealed antiviral activity in the polysaccharide fraction and also in a fraction depleted of polysaccharides and tannins. We conclude that aqueous A platensis extracts contain antiretroviral activity that may be of potential clinical interest.

17 of 19

TI: [Elemental composition of bacterial cells of various taxa]  
AU: Nikitin-DI; Sorokin-VV; Pitriuk-IA; Nikitina-ES  
AD: Institute of Microbiology, Russian Academy of Sciences, Moscow, Russia.  
SO: Prikl-Biokhii-Mikrobiol. 1998 Mar-Apr; 34(2): 180-2  
This source is not available in the S.J.M.C. Library.

LA: RUSSIAN; NON-ENGLISH

AB: The elemental compositions of cells of representatives of five bacterial genera (Hyphomonas vulgare NP-160, Caulobacter bacteroides NP-105, Flectobacillus major Mm, Escherichia coli, and Spirulina platensis) was studied by electron microscopic x-ray microanalysis. The contents of P, S, Cl, K, and Ca were determined. The bacterial species studied in this work substantially differ by the contents of these elements. A high content of K is typical of S. platensis, whereas F. major, an aquatic form, is rich in Cl. The other bacterial species were had the levels of K, Ca, and the K/Ca index, which correlated with the stability of their cell membranes and resistance to stress. In E. coli, the spectrum of the elemental composition and the values of P/S and K/Ca are indicative of high energy potential and low tolerance of membranes.

18 of 19

TI: The cyanobacterium Spirulina platensis contains a long wavelength-absorbing pigment C738 (F76077K) at room temperature.

AU: Koehnle-B; Trissl-HW  
AD: Abteilung Biophysik, Fachbereich Biologie/Chemie, Universität Osnabrück,  
FRG.

SO: Biochemistry. 1998 Apr 21; 37(16): 5494-500

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Call Number: from 1964-1987

LA: ENGLISH

AB: *Spirulina platensis* is a cyanobacterium which usually lives under high-light conditions. Nonetheless, it is thought to contain the most red-shifted antenna pigment of all known Chl a-containing phototrophic organisms, as shown by its 77 K fluorescence peaking at 760 nm. To exclude preparation artifacts and to exclude the possibility that long wavelength-absorbing pigments form only when the temperature is lowered to 77 K, we carried out experiments with whole cells at room temperature. The combined analysis of stationary absorption and fluorescence spectra as well as fluorescence induction and time-resolved fluorescence decays shows that the pigment responsible for the 77 K fluorescence at 760 nm (i) has the oscillator strength of approximately one Chl a molecule, (ii) absorbs maximally at 738 nm (i), (iii) is present only in the antenna system of PS I, (iv) participates in light collection, and (v) does not entail a low photochemical quantum yield. Other, more abundant but less red-shifted Chl a antenna pigments lead to a significantly larger absorption cross section of the photosynthetic unit of PS I above 700 nm compared to units that would not possess these long wavelength-absorbing pigments. These results support the hypothesis that the physiological role of long wavelength-absorbing pigments is to increase the absorption cross section at wavelengths of >700 nm when in densely populated mats the spectrally filtered light is relatively more intense at these wavelengths [Trissl, H.-W. (1993) Photosynth. Res. 35, 247-263].

19 of 19

TI: Recovery of gold from thiourea solutions using microorganisms.

AU: Savvaidis-I

AD: Department of Microbiology, Medical School, University of Ioannina, Greece.

isavvaids@cc.uoi.gr

SO: Biometals. 1998 Apr; 11(2): 145-51

This source is not available in the G.J.M.C. Library

LA: ENGLISH

AB: The recovery of gold from gold-thiourea solutions using various types of waste biomass was investigated. All organisms tested, namely, *Saccharomyces cerevisiae*, *Spirulina platensis* and *Streptomyces erythraeus* removed gold rapidly from gold-thiourea solutions. The process of gold accumulation was pH-dependent for *Saccharomyces cerevisiae* and *Streptomyces erythraeus* and independent of pH in the case of *Spirulina platensis*. Of all strains of microorganisms examined, *Spirulina platensis* had the highest affinity and capacity for gold even at low pH values. Thus, all three microorganisms tested for their ability to recover gold from gold-thiourea solutions can therefore be used in biotechnological applications, especially *Spirulina platensis* which has the highest binding capacity for gold at low pH values.

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1 of 9

TI: Phycocyanin extract reduces leukotriene B4 levels in arachidonic acid-induced mouse-ear inflammation test [letter]

AU: Romay-C; Ledon-N; Gonzalez-R

SO: J-Pharm-Pharmacol. 1979 May; 51(5): 641-2

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Call Number: from 1959-1962

LA: ENGLISH

2 of 9

TI: Modulation of lead toxicity by Spirulina fusiformis.

AU: Shastri-D; Kumar-M; Kumar-A

AD: Department of Zoology, University of Rajasthan, India.

SO: Phytother-Res. 1979 May; 13(3): 258-60

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: The modulatory effects of lead toxicity by Spirulina fusiformis (Oscillatoraceae) were observed on the testes of Swiss albino mice at a dose of 800 mcg/kg body weight. The Spirulina fusiformis was non-toxic at the dose given. A significant enhancement in the survival time was observed in the pre- and post-treated Spirulina group compared with the control (lead treated) group. Lead induced toxicity was also reduced in terms of testes weight, animal weight, tubular diameter in the pre Spirulina treated group. The modulatory effects of Spirulina may be attributed to the presence of the antioxidants, beta-carotene and SOD enzyme.

3 of 9

TI: In vitro oligomerization of a membrane protein complex. liposome-based reconstitution of trimeric photosystem I from isolated monomers.

AU: Kruij-J; Karapetyan-NV; Terakhova-IV; Rogner-M

AD: Faculty of Biology, Plant Biochemistry, Ruhr-University Bochum, D-44780 Bochum, Germany.

SO: J-Biol-Chem. 1999 Jun 25; 274(26): 18181-8

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Call Number: from 1952-1994

LA: ENGLISH

AB: Many membrane proteins can be isolated in different oligomeric forms. Photosystem I (PSI), for example, exists in cyanobacteria either as a monomeric or as a trimeric complex. Neither the factors responsible for the specific trimerization process nor its biological role are known at present. In the filamentous cyanobacterium Spirulina platensis, trimers in contrast to monomers show chlorophyll fluorescence emission at 760 nm. To investigate the oligomerization process as well as the nature of the long wavelength chlorophylls, we describe here an in vitro reconstitution procedure to assemble trimeric PS I from isolated purified PS I monomers. Monomers (and trimers) were extracted from S. platensis with n-dodecyl beta-D-maltoside and further purified by perfusion chromatography steps. The isolated complexes had the same polypeptide composition as other cyanobacteria (PsaA-PsaF and PsaI-PsaM), as determined from high resolution gels and immunoblotting. They were incorporated into proteoliposomes, which had been prepared by the detergent absorption method, starting from a phosphatidylcholine:phosphatidic acid mixture

solubilized by octylglucoside. After the addition of monomeric PS I (lipid:chlorophyll, 25:1), octylglucoside was gradually removed by the stepwise addition of Biobeads. The 77 K fluorescence emission spectrum of these proteoliposomes displays a long wavelength emission at 760 nm that is characteristic of PS I trimers, which indicates for the first time the successful in vitro reconstitution of PS I trimers. In addition, a high performance liquid chromatography analysis of complexes extracted from these proteoliposomes confirms the formation of structural trimers. We also could show with this system 1) that at least one of the stromal subunits PsaC, -D, and -E is necessary for trimer formation and 2) that the extreme long wavelength emitting chlorophyll is formed as a result of trimer formation.

4 of 9

TI: Modulatory potential of Spirulina fusiformis on carcinogen metabolizing enzymes in Swiss albino mice.

AU: Mittal-A; Kumar-PV; Banerjee-S; Rao-AR; Kumar-A

AD: Department of Zoology, University of Rajasthan, Jaipur, India.

SO: Phytother-Res. 1979 Mar; 13(2): 111-4

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: The modulatory potential of Spirulina fusiformis was observed on the hepatic and extrahepatic carcinogen metabolizing enzymes in Swiss albino mice at a dose of 800 mg/kg b.w. given orally. A significant reduction in the hepatic cytochrome P-450 content was observed in the group treated with Spirulina in comparison with the control group. The hepatic glutathione S-transferase activity was induced significantly by Spirulina treatment. There was no change in the extrahepatic glutathione S-transferase activity after the animals were fed with Spirulina.

5 of 9

TI: [Effect of biologically active food additives containing autolysate of baker's yeast and spirulina on intestinal permeability in an experiment]

AU: Maza-YK; Smoshinskii-IV; Sokolova-AG; Zorin-SN; Danilina-LL; Litvinova-AV; Radchenko-SN

SO: Vopr-Pitan. 1979; 68(1): 17-9

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LA: RUSSIAN; NON-ENGLISH

AB: Influence of bioactive food supplements (BFA) intake on intestinal barrier permeability to macromolecules of polyethylene glycol 4000 was studied in rats with intestinal anaphylaxis and after external gamma-irradiation. BFA studied included autolysed baker's yeast ("Vitasil") and edible algae Spirulina platensis. Intake of complex additive Vitasil + Spirulina resulted in significant diminution of permeability before irradiation and its partial normalization (24% decrease) after irradiation. Spirulina additive intake led to practically complete normalization of permeability (1.84 times decrease) in anaphylactic rats. It is concluded that Spirulina and Vitasil are promising BFA for organism general resistance elevation.

6 of 9

TI: Studies on the preventive effect of Spirulina maxima on fatty liver development induced by carbon tetrachloride, in the rat.

AU: Torres-Duran-PV; Miranda-Zamora-R; Paredes-Carabajal-MC; Mascher-D;

Ble-Castillo-J; Diaz-Zagoya-JC; Juarez-Dropeza-NA

AD: Department of Biochemistry, School of Medicine, UNAM, Mexico D.F., Mexico.

SO: J-Ethnopharmacol. 1979 Feb; 64(2): 141-7

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: The aim of the present work was to assess if the feeding of either the oil extract of Spirulina maxima or of its defatted fraction would prevent fatty

liver development, induced in rats by a single intraperitoneal dose of carbon tetrachloride (CCl4). Liver and serum lipids were evaluated 4 days after treatment with this agent. Concentration of liver lipids did not differ in rats fed on a purified diet either without or with one of the fractions of Spirulina, except for total cholesterol, which showed a slight increase in the group receiving the oil extract of Spirulina. However, after CCl4 treatment, liver total lipids and triacylglycerols were significantly lower in rats fed on a diet containing any fraction of Spirulina (defatted or the oil fraction) than in rats without Spirulina in their diet. Furthermore, the increased liver cholesterol values, induced by CCl4 treatment, were not observed in rats receiving Spirulina. In addition, rats receiving whole Spirulina in their diet and treated only with the vehicle showed an increase in the percentage of HDL values. The changes in VLDL and LDL induced by CCl4 treatment were not observed in the whole Spirulina group. Furthermore, after CCl4 treatment the values of the liver microsomal thiobarbituric acid-reactive substances were lower in the whole Spirulina group than in the control group. These results support the potential hepatoprotective role of Spirulina.

7 of 9

TI: Preparation of a genomic library using a TA vector.

AI: Kawata-Y; Yano-S; Thankappan-AK; Daniel-EC; Kojima-H

AD: Osaka National Research Institute, Agency of Industrial Science and Technology, Ikeda, Japan.

SD: Prep-Biochem-Biotechnol. 1999 Feb; 29(1): 91-100

— This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: An efficient and simple method for constructing a genomic DNA library is presented using a TA cloning vector. It is based on sonication cleavage of genomic DNA, blunting of the fragment ends with mung bean nuclease, and addition of a single 3'-deoxyadenylate with Taq DNA polymerase, followed by ligation with a TA vector. This method is useful for improving the quality of genomic libraries for organisms whose genomic DNA is not well digested with restriction enzymes owing to the presence of polysaccharides and/or DNA methylation.

8 of 9

TI: Arthrospira ('Spirulina') strains from four continents are resolved into only two clusters, based on amplified ribosomal DNA restriction analysis of the internally transcribed spacer.

AI: Scheldeman-P; Baurain-D; Ecuhy-R; Scott-M; Muhling-M; Whitton-BA; Belay-A; Wilmotte-A

AD: Department of Botany B22, University of Liege, Belgium.

SD: FEMS Microbiol-Lett. 1999 Mar 15; 172(2): 213-22

— This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: We present the results of a phylogenetic study, based on amplified ribosomal DNA restriction analysis of the rDNA operon, of 37 Arthrospira ('Spirulina') cultivated clonal strains from four continents. In addition, duplicates from different culture collections or markedly different morphotypes of particular strains established as clonal cultures were treated as separate entries, resulting in a total of 51 tested cultures. The strain Spirulina laxissima SAC 256.80 was included as outgroup. The 16S rRNA genes appeared too conserved for discrimination of the strains by amplified ribosomal DNA restriction analysis, and thus the internally transcribed spacer was selected as molecular taxonomic marker. The internally transcribed spacer sequences situated between the 16S and the 23S rRNA were amplified by polymerase chain reaction and yielded amplicons of about 540 bp. Direct use of cells for polymerase chain reaction seemed to inhibit the amplification reaction. This was overcome by the design of a crude lysis protocol and addition of bovine

serum albumin in the polymerase chain reaction mix. The amplicons were digested with four restriction enzymes (EcoRV, HhaI, HinfI, MseI) and the banding patterns obtained were analyzed. Cluster analysis showed the separation of all the strains into two main clusters. No clear relationships could be observed between this division into two clusters and the geographic origin of the strains, or their designation in the culture collections, or their morphology.

9 of 9

TI: Electron spin resonance studies on photosensitized formation of hydroxyl radical by C-phycocyanin from *Spirulina platensis*.

AU: Zhang-S; Xie-J; Zhang-J; Zhao-J; Jiang-L

AD: Institute of Photographic Chemistry, Academia Sinica, Beijing 100101, People's Republic of China.

SD: Biochim-Biophys-Acta. 1999 Jan 4; 1426(1): 205-11

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LA: ENGLISH

AB: Visible light (>470 nm) irradiation of an oxygen-saturated solution of C-phycocyanin (C-PC) in the presence of the spin trap 5, 5-dimethyl-1-pyrroline-N-oxide (DMPO) gave an ESR spectrum characteristic of the DMPO-hydroxyl radical spin adduct DMPO-OH. The signal intensities of DMPO-OH adduct were enhanced by superoxide dismutase (SOD) and partly inhibited by catalase. It was partly responsible for the production of DMPO-OH that superoxide anion radical (O<sub>2</sub><sup>-</sup>) dismutated to generate hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) which decomposed ultimately to generate the highly reactive .OH. In addition, it can be concluded that singlet oxygen (<sup>1</sup>O<sub>2</sub>) was an important intermediate according to the strong inhibitory action of 1,4-diazabicyclo[2.2.2]octane (DABCO) and histidine on DMPO-OH formation. The experimental results suggest that photodynamic action of C-PC proceed via both type I and type II mechanisms. Furthermore, the decay kinetics of DMPO-OH adduct, the effects of DMPO and C-PC concentrations as well as irradiation time on DMPO-OH adduct formation were also discussed. Concentration of C-PC should be an important factor to influence the ESR signal intensities of DMPO-OH. Therefore, it may be concluded that reasonably lower concentration of C-PC might prolong the duration of photosensitized formation of .OH and might strengthen the photodynamic action.



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1 of 3

TI: The halotolerance and phylogeny of cyanobacteria with tightly coiled trichomes (*Spirulina* Turpin) and the description of *Halospirulina tapeticola* gen. nov., sp. nov.

AU: Nubel-U; Garcia-Pichel-F; Muyzer-G

AD: Max-Planck-Institute for Marine Microbiology, Bremen, Germany.  
unuobel@montana.edu

SO: Int-J-Syst-Evol-Microbiol. 2000 May; 50 Pt 3: 1265-77

LA: ENGLISH

AB: The morphologies, halotolerances, temperature requirements, pigment compositions and 16S rRNA gene sequences of five culture collection strains and six novel isolates of cyanobacteria with helical, tightly coiled trichomes were investigated. All strains were very similar morphologically and could be assigned to the genus *Spirulina* (or section *Euspirulina* sensu Geitler), according to traditional classification. However, the isolates showed significantly different requirements for salinity and temperature, which were in accordance with their respective environmental origins. The genetic divergence among the strains investigated was large. The results indicate the drastic underestimation of the physiological and phylogenetic diversity of these cyanobacteria by the current morphology-based classification and the clear need for new taxa. Three of the isolates originated from hypersaline waters and were similar with respect to their high halotolerance, broad euryhalinity and elevated temperature tolerance. By phylogenetic analyses, they were placed in a tight monophyletic cluster apart from all other cyanobacteria. Thus it is proposed to reclassify highly halotolerant cyanobacteria with tightly coiled trichomes in *Halospirulina* gen. nov., with the type species *Halospirulina tapeticola* sp. nov.

2 of 5

TI: [The adaptive potentials of those who worked in the cleanup of the aftermath of the accident at the Chernobyl Atomic Electric Power Station under the influence of different treatment methods]

AU: Zozulia-IB; Iurchenko-AV

SO: Lik-Sprava. 2000 Apr-Jun(3-4): 18-21

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LA: UKRAINIAN; NON-ENGLISH

AB: A comprehensive evaluation was done in 162 patients-liquidators of the Chernobyl accident. Of these, 80 percent were diagnosed as having stage I and II dyscirculatory encephalopathy (DE), 20 percent were in stage III. It is shown that DE progression is caused by great strain on and breakdown of autoregulatory mechanisms of different biological systems (vascular, central nervous and vegetative, hormonal), and of central regulatory mechanisms as well. Under certain conditions there may occur their breakdown, with syncopal states, crises, and even insults developing in its wake. Treatment and rehabilitation of DE liquidators with pyracetam, vinpocetine, cerebrollysine with magne B6, and phytosorbents (*spirulina*, quercitrol, and vitapectine) lead to reconditioning of central and autoregulatory compensatory-and-adaptive mechanisms, long-lasting remission, provide complication prophylaxis and promote work activity.

3 of 5

TI: Polyhydroxybutyrate production from carbon dioxide by cyanobacteria.  
AU: Miyake-M; Takase-K; Narato-M; Khatipov-E; Schnackenberg-U; Shirai-M;  
Kurane-R; Asada-Y  
AD: National Institute of Bioscience and Human-Technology, Ibaraki, Japan.  
amiyake@nibh.go.jp

SO: Appl-Biochem-Biotechnol. 2000 Spring; 94-96: 991-1002

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LA: ENGLISH

AB: Genetic characterization and enhancement of polyhydroxybutyrate (PHB) accumulation in cyanobacteria were investigated for efficient PHB production from CO<sub>2</sub>. The genome DNAs in the PHB-accumulating strains *Synechococcus* sp. MA19 and *Spirulina platensis* NIES46 retained the highly homologous region to phaC of *Synechocystis* PCC6803, whereas low homology was detected in the nonaccumulating strains *Synechococcus* sp. PCC7942 and *Anabaena cylindrica* NIES19. *Synechococcus* sp. MA19, which accumulates PHB up to 30% of dry cell weight from CO<sub>2</sub> as the sole carbon source, was mutated by insertion of transposon Tn5 to enhance the PHB accumulation. Genetic and physiological analysis of the mutant indicated that decreased phosphotransacetylase activity could trigger an increase of acetyl coenzyme A leading to enhancement of PHB accumulation. PHB synthase in *Synechococcus* sp. MA19 was probably attached to thylakoid membrane since PHB granules were associated with pigments. A genetically engineered cyanobacteria retaining soluble PHB synthase from *Ralstonia eutropha* accumulated pigment-free PHB granules, which is an advantage for the purification of PHB.

4 of 5

TI: C-phycoerythrin: a potent peroxyl radical scavenger in vivo and in vitro.

AU: Bhat-VB; Madyastha-KM

AD: Department of Organic Chemistry, Indian Institute of Science, Bangalore, 560 012, India.

SO: Biochem-Biophys-Res-Commun. 2000 Aug 18; 275(1): 20-5

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: C-Phycocyanin (from *Spirulina platensis*) effectively inhibited CCl<sub>4</sub>-induced lipid peroxidation in rat liver in vivo. Both native and reduced phycocyanin significantly inhibited peroxyl radical-induced lipid peroxidation in rat liver microsomes and the inhibition was concentration dependent with an IC<sub>50</sub> of 11.35 and 12.7 microM, respectively. The radical scavenging property of phycocyanin was established by studying its reactivity with peroxyl and hydroxyl radicals and also by competition kinetics of crocin bleaching. These studies have demonstrated that phycocyanin is a potent peroxyl radical scavenger with an IC<sub>50</sub> of 5.0 microM and the rate constant ratios obtained for phycocyanin and uric acid (a known peroxyl radical scavenger) were 1.54 and 3.5, respectively. These studies clearly suggest that the covalently linked chromophore, phycocyanobilin, is involved in the antioxidant and radical scavenging activity of phycocyanin. Copyright 2000 Academic Press.

5 of 5

TI: Supercritical carbon dioxide extraction of *spirulina platensis* component and removing the stench.

AU: Guihui-H

AD: College of Food Science, Nanjing Agricultural University, Nanjing 210095, China.

SO: J-Agric-Food-Chem. 1999 Jul; 47(7): 2705-6

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LA: ENGLISH

AB: The chemical component of *spirulina* was determined by supercritical CO<sub>2</sub> extraction. The protein and essential amino acid contents of *spirulina* powder were not significantly decreased through supercritical CO<sub>2</sub> extraction, but

the contents of total amino acid and lipids were reduced. The spirulina powder had a stench smell before, but not after, supercritical CO<sub>2</sub> extractions. The highest yield rate of lipids was obtained at an extraction pressure of 35 MPa and an extraction time of 4 h. The lipids could be used as additives of health foods containing gamma-linolenic acid.

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1 of 10

TI: Physico-chemical parameters influencing DNase activity of the cyanobacterium Spirulina platensis.

AU: Cao-J; Liang-D; Xu-Z; Qiu-G; Li-B; Vonshak-A

AD: Marine Biotechnology Center, University of California, Santa Barbara 93106, USA. cao@lifesci.ucsb.edu

SO: Microbiol-Res. 2000 Apr; 155(1): 59-63

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LA: ENGLISH

AB: The effects of temperature, Mg<sup>2+</sup>, EDTA concentration and rinsing on extra- and intra-cellular DNase activity of Spirulina platensis strain SSP-14, were investigated. The results indicate that the tested strain contains very high extra- and intracellular DNase activity, which actually hinders the transfer of foreign gene(s) to *S. platensis*, a cyanobacterium with multiple economic potentials. The extracellular DNase activity could easily be removed by rinsing the cells with Zarrouk medium more than once. The intracellular DNase activity could also be inhibited by (1) removal of Mg<sup>2+</sup>, (2) maintaining EDTA concentration above 1 mmol l<sup>-1</sup>, and (3) manipulating below 0-4 degrees C, during all the incubation procedures. We suggest that, by using one or more of, or combining, all those experimental conditions, the chances of foreign DNA attempted to be introduced into *S. platensis* without being digested would be increased.

2 of 10

TI: [The postirradiation use of vitamin-containing complexes and a phycoyanin extract in a radiation lesion in rats]

AU: Karpov-IM; Brown-II; Poltavtseva-NV; Ershova-ON; Karakis-SG; Vasil'eva-TV; Cheban-IuL

AD: Mechnikov Odessa State University, Ukraina.

SO: Radiat-Biol-Radioecol. 2000 May-Jun; 40(3): 310-4

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LA: RUSSIAN; NON-ENGLISH

AB: Wistar rats have been exposed to X-rays with a dose of 5 Gy. Significant decrease in dehydrogenase activity, energy-rich phosphate level and efficiency of antioxidant defence and significant increase in pyruvate amount were observed within 4 weeks. It was also found that the feeding of exposed rats with phycoyanin extract from blue-green algae Spirulina platensis lead to correcting effect. The same result was observed after injections of tocopherol or complex of six water-soluble vitamins. The combination of above mentioned compounds had more marked effect, especially at the presence unitiole and Na<sub>2</sub>S<sub>2</sub>O<sub>6</sub>.

3 of 10

TI: [Study of the factors of Cr(III) bioaccumulation on Spirulina platensis]

AU: Li-ZY; Li-YG; Guo-SY; Li-L; Zhang-SL

AD: School of Food & Biological Engineering, South China University of Technology, Guangzhou.

SO: Sheng-Wu-Kung-Cheng-Hsueh-Pao. 2000 Jan; 16(1): 108-12

LA: CHINESE; NON-ENGLISH

AB: Some factors of Cr(III) bioaccumulation on Spirulina platensis were studied in detail. It was found that the bioaccumulation of Cr(III) on Spirulina

platensis involved two steps: rapid adsorption and slow absorption. Chromic(III) compounds with weaker chemical bond had higher bioaccumulation efficiency. Under the same algal cell concentration, Cr(III) bioaccumulation rose up with Cr(III) concentration. On the other hand, with Cr(III) concentration not changed, the total bioaccumulation of Cr(III) on Spirulina platensis increased with algal cell concentration, but the Cr(III) bioaccumulation on unit algae reduced. The study also showed that Spirulina platensis powder could bioaccumulate more Cr(III) than fresh Spirulina platensis, pH is a quite important factor and more suitable pH for Cr(III) bioaccumulation is 7. It was also proved that Cr(III) bioaccumulation benefited from the increase of temperature and light intensity. Cations had either stimulation or inhibition effects on the Cr(III) bioaccumulation on Spirulina platensis.

4 of 10

TI: Effect of ultraviolet-B radiation on intact cells of the cyanobacterium Spirulina platensis: characterization of the alterations in the thylakoid membranes.

AU: Rajagopal-S; Murthy-SD; Mohanty-P

AD: Department of Biochemistry, Sri Venkateswara University, Tirupati, India.

SD: J-Photochem-Photobiol-B. 2000 Jan; 54(1): 61-6

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Intact trichomes of Spirulina platensis are exposed to ultraviolet-B (UV-B) radiation (270-320 nm; 1.9 mW m<sup>-2</sup>) for 9 h. This UV-B exposure results in alterations in the pigment-protein complexes and in the fluorescence emission profile of the chlorophyll-protein complexes of the thylakoids as compared with thylakoids isolated from control dark-adapted Spirulina cells. The UV-B exposure causes a significant decrease in photosystem II activity, but no loss in photosystem I activity. Although there is no change in the photosystem I activity in thylakoids from UV-B-exposed cells, the chlorophyll a emission at room temperature and at 77 K indicates alterations associated with photosystem I. Additionally, the results clearly demonstrate that the photosystem II core antennae of chlorophyll proteins CP47 and CP43 are affected by UV-B exposure, as revealed by Western blot analysis. Furthermore, a prominent 94 kDa protein band appears in the sodium dodecylsulfate polyacrylamide gel electrophoresis (SDS-PAGE) profile of UV-B-exposed cell thylakoids, which is absent from the control thylakoids. This 94 kDa protein appears not to be newly induced by UV-B exposure, but could possibly have originated from the UV-B-induced cross-linking of the thylakoid proteins. The exposure of isolated Spirulina thylakoids to the same intensity of UV-B radiation for 1-3 h induces losses in the CP47 and CP43 levels, but does not induce the appearance of the 94 kDa protein band in SDS-PAGE. These results clearly demonstrate that prolonged exposure of Spirulina cells to moderate levels of UV-B affects the chlorophyll a-protein complexes and alters the fluorescence emission spectral profile of the pigment-protein complexes of the thylakoid membranes. Thus, it is clear that chlorophyll a antennae of Spirulina platensis are significantly altered by UV-B radiation.

5 of 10

TI: [The selenium haemostasis during experimental anaphylaxis reaction in rats treated with reduced glutathione and selenium enriched spirulina]

AU: Golubkina-NA; Mazo-VK; Gmshinskii-IV; Zorin-SM; Tamberiev-AKH; Kirikova-NN

AD: Institute of Nutrition, RAMS, Moscow.

SD: Vopr-Med-Khim. 2000 Jan-Feb; 46(1): 22-7

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LA: RUSSIAN; NON-ENGLISH

AB: The main events caused by anaphylaxis in selenium haemostasis in rats include significant increase of selenium excretion with urine (6.36 +/- 1.18 nM

Se/18 h., n = 10, compared with  $1.72 \pm 0.38$  nM Se/18 h., n = 10) and decrease of selenium plasma/selenium erythrocytes ratio from 0.939 to 0.791. Reduced glutathione (G-SH) administration led to 1.5-fold decrease of plasma selenium level and 1.3-fold increase of selenium concentration in intestinal walls of sensitized rats ( $r = -0.720$ ,  $P < 0.001$ ). Chromatographic separation of plasma proteins showed that intragastric intubation of G-SH to sensitized rats significantly decreased the protein P content and did not influence the concentration of Se-GSHPx, thus indicating the local selenium acceptor role of G-SH. G-SH administration did not influence the intestinal permeability in sensitized rats while use of complex additive: G-SH and selenium enriched spirulina--normalized the latter parameter and the ratio of protein P/Se-GSHPx in plasma.

6 of 10

II: [Intracellular phosphorus pool in a culture of the cyanobacterium Spirulina platensis]

AU: Bolsunovskii-AIa; Kosinenko-SV

AD: Institute of Biophysics, Siberian Division, Russian Academy of Sciences, Krasnoyarsk, Russia.

SD: Mikrobiologiya. 2000 Jan-Feb; 69(1): 135-7

This source is not available in the S.J.M.C. Library

LA: RUSSIAN; NON-ENGLISH

AB: An intracellular phosphorus pool in a monoculture of the cyanobacterium Spirulina platensis was assessed using radioactive and nonradioactive phosphorus. The derived dependence of specific growth rate on the intracellular content of mineral phosphorus can be presented in the form of the Droop equation. It was found that the stage of replenishment of the intracellular phosphorus pool may affect the phosphorus turnover estimation in aquatic environments from the results of short-term measurements of phosphorus uptake.

7 of 10

II: Changes of the photosynthetic apparatus in Spirulina cyanobacterium by sodium stress.

AU: Verma-K; Mohanty-P

AD: School of Life Sciences, Jawaharlal Nehru University, New Delhi, India.

SD: Z-Naturforsch-C. 2000 Jan-Feb; 53(1-2): 16-22

This source is not available in the S.J.M.C. Library

LA: ENGLISH

AB: Spirulina platensis trichomes grown in Zarrouks medium having total Na<sup>+</sup> concentration as 0.14 M when transferred to fresh Zarrouks medium containing enhanced level of Na<sup>+</sup> ions equal to 0.96 M showed 30% more accumulation of Na<sup>+</sup> intracellularly as compared to the control. An inhibition of photosystem II activity to almost 66% was observed. Also due to this exposure to high Na<sup>+</sup>, the room temperature absorption characteristics of Spirulina trichomes and the thylakoid membrane preparations were altered indicating changes in the chromophore protein interactions and alterations in the phyococyanin/allophycocyanin ratio; there by affecting the energy harvest and energy transfer processes. An increase in the carotenoid absorption was two fold over the control in the treated sample. Similarly, room temperature and low temperature (77 K) fluorescence emission spectra collectively suggested alterations in the chlorophyll a emissions, F 726 of photosystem I reflecting changes in the lipid protein environment of the thylakoid. Our results indicate that in Spirulina the enhanced Na<sup>+</sup> level alters the energy harvest and transfer processes. It also affected the emission characteristics of chlorophyll a of photosystem I.

8 of 10

II: Temperature-independent and -dependent expression of desaturase genes in filamentous cyanobacterium Spirulina platensis strain C1 (*Arthrospira* sp. PCC

9430).

AM: Deshmium-F; Paithoonrangasrid-K; Suphatratul-A; Meesapyodsuk-D;

Tanticharoen-M; Cheevadhanarak-S

AD: National Center for Genetic Engineering and Biotechnology, Rama VI Rd.,

Bangkok, Thailand. ipnium@cc.ku.ac.th

SO: FEMS-Microbiol-Lett. 2000 Mar 15; 184(2): 207-13

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LA: ENGLISH

AB: The alteration of the degree of unsaturated fatty acids in membrane lipids has been shown to be a key mechanism in the tolerance to temperature stress of living organisms. The step that most influences the physiology of membranes has been proposed to be the amount of di-unsaturated fatty acids in membrane lipids. In this study, we found that the desaturation of fatty acid to yield the di-unsaturated fatty acid 18:2(9,12), in *Spirulina platensis* strain C1, was not regulated by temperature. As shown by the fatty acid composition and gene expression patterns, the levels of 18:1(9) and 18:2(9,12) remained almost constant either when the cells were grown at 35 degrees C (normal growth temperature) or 22 and 40 degrees C. The expression of *desC* ( $\Delta$ 149) and *desA* ( $\Delta$ 1412) genes, which are responsible for the introduction of first and second double bonds into fatty acids, respectively, was not affected by the temperature shift from 35 to 22 degrees C or to 40 degrees C. Only the expression and mRNA stability of the *desD* gene ( $\Delta$ 146) that is responsible for the introduction of a third double bond into fatty acids were enhanced by a temperature shift from 35 to 22 degrees C, but not the shift from 35 to 40 degrees C. The increase in the level of *desD* mRNA elevated the desaturation of fatty acid from 18:2(9,12) to 18:3(6,9,12) at 22 degrees C. However, the increased level of 18:3(6,9,12) was observed after 36 h of incubation at 22 degrees C, indicating a slow response to temperature of fatty acid desaturation in this cyanobacterium. These findings suggest that the desaturation of fatty acids might not be a key mechanism in the response to the temperature change of *S. platensis* strain C1.

9 of 10

TI: Pseudovitamin B(12) is the predominant cobamide of an algal health food, *spirulina* tablets.

AU: Watanabe-F; Katsura-H; Takenaka-S; Fujita-T; Abe-K; Tamura-Y; Nakatsuka-T; Nakano-Y

AD: Department of Health Science, Kochi Women's University, Kochi 780-8515, Japan. watanabe@cc.kochi-wu.ac.jp

SO: J-Agric-Food-Chem. 1999 Nov; 47(11): 4736-41

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LA: ENGLISH

AB: The vitamin B(12) concentration of an algal health food, *spirulina* (*Spirulina* sp.) tablets, was determined by both *Lactobacillus leichmannii* ATCC 7830 microbiological and intrinsic factor chemiluminescence methods. The values determined with the microbiological method were approximately 6-9-fold greater in the *spirulina* tablets than the values determined with the chemiluminescence method. Although most of the vitamin B(12) determined with the microbiological method was derived from various vitamin B(12) substitutive compounds and/or inactive vitamin B(12) analogues, the *spirulina* contained a small amount of vitamin B(12) active in the binding of the intrinsic factor. Two intrinsic factor active vitamin B(12) analogues (major and minor) were purified from the *spirulina* tablets and partially characterized. The major (83%) and minor (17%) analogues were identified as pseudovitamin B(12) and vitamin B(12), respectively, as judged from data of TLC, reversed-phase HPLC, (1)H NMR spectroscopy, ultraviolet-visible spectroscopy, and biological activity using *L. leichmannii* as a test organism and the binding of vitamin B(12) to the intrinsic factor.

TI: Characterization of the transient species generated by the photoexcitation of C-phycoerythrin from Spirulina platensis: a laser photolysis and pulse radiolysis study.

AU: Zhang-SP; Qian-SP; Zhao-JQ; Yao-SD; Jiang-LJ

AD: Center for Molecular Science, Institute of Chemistry, The Chinese Academy of Sciences, Beijing.

SD: Biochim-Biophys-Acta. 1999 Oct 18; 1472(1-2): 270-8

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LA: ENGLISH

AB: Nanosecond laser flash photolysis and pulse radiolysis were used to generate and characterize the triplet state and cation radical of C-phycoerythrin (C-PC) from Spirulina platensis. The transient absorption spectra of C-PC were measured from direct excitation and acetone sensitization in aqueous solution at room temperature by KrF (248 nm) laser flash photolysis. Laser-induced transient species have been characterized by the method of acetone sensitization and one-electron oxidation. In nitrous oxide-saturated phosphate buffer saline (pH = 7.0) of C-PC, the produced intermediates are assigned to the excited triplet state and the radical cation. Using acetone as photosensitizer, the C-PC excited triplet states produced via triplet-triplet energy transfer and the C-PC radical cation from electron transfer reaction were further confirmed. Furthermore, the corresponding kinetic parameters were determined. To our knowledge, the transient absorption spectra of C-PC have been reported for the first time.



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1 of 9

TI: Effects of phycocyanin extract on prostaglandin E2 levels in mouse ear inflammation test.

AU: Romay,-D; Ledon,-N; Gonzalez,-R

AD: Departamento de Farmacologia, Centro Nacional de Investigaciones Cientificas, CNIC, Habana, Cuba. Cheyia@quimica.cneuro.edu.cu

SD: Arzneimittelforschung. 2000 Dec; 50(12): 1106-9

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LA: English

AB: Recently it was demonstrated that phycocyanin, a biliprotein isolated from microalgae *Spirulina*, exerts anti-inflammatory activity in several animal models of inflammation. In this report, the effects of phycocyanin on prostaglandin E2 (PGE2) concentrations and phospholipase A2 (PLA2) activity were determined in arachidonic acid (AA) and 12-O-tetradecanoyl phorbol 13-acetate (TPA)-induced mouse ear edema, respectively. Phycocyanin (50-200 mg/kg p.o.) inhibited in a dose-dependent manner PGE2 levels in mouse ear treated with AA. Also, phycocyanin (100-400 mg/kg p.o.) moderately reduced PLA2 activity in TPA-induced mouse ear inflammation test. In this model triamcinolone (10 mg/kg p.o.) used as reference drug exerted a remarkable inhibitory effect on PLA2 activity. These results provide the first evidence that the anti-inflammatory effects of phycocyanin may result, at least partially, from inhibition of PGE2 production and a moderate inhibition of PLA2 activity.

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TI: Novel testing of human gastric motor and sensory functions: rationale, methods, and potential applications in clinical practice.

AU: Kim,-D-Y; Myung,-S-J; Camilleri,-M

AD: Gastroenterology Research Unit, Mayo Clinic and Mayo Foundation, Rochester, Minnesota 55905, USA.

SD: Am-J-Gastroenterol. 2000 Dec; 75(12): 3365-73

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Call Numbers: from 1775-1982

LA: English

AB: Sensitive and reproducible tests are essential to investigate the mechanisms of gastric motility and sensation in healthy humans and patients with unexplained upper gastrointestinal symptoms. Electrogastrography, manometry, scintigraphic emptying, and barostat studies with an intragastric balloon were initially used to understand physiology and pathophysiology of gastric motility. However, manometry and barostat studies are time-consuming, costly, and invasive, thus reducing their widespread clinical application. To overcome these shortcomings, several novel approaches have been proposed: water/nutrient drink test, paracetamol absorption test, 13C-octanoic acid or *spirulina* breath tests, ultrasonography, magnetic resonance imaging (MRI), single photon emission computed tomography (SPECT), and tensesostat. The water/nutrient (satiety) test is a noninvasive test proposed as an alternative to sensory studies performed with an intragastric balloon. The satiety test cannot measure gastric accommodation; interpretation of sensory tests usually has required independent assessment of accommodation or compliance. The tensesostat can be used as a gastric sensation test because it measures gastric wall tension, which is related to the perception of gastric distention. To

measure gastric emptying, the paracetamol absorption test, 13C breath tests, ultrasound, or MRI can be used. The paracetamol absorption test can measure the gastric emptying of liquids. 13C breath test can measure the gastric emptying of solids or liquids and can achieve accuracy comparable with gastric scintigraphy. Ultrasonography requires special skills, and MRI requires costly equipment. To measure gastric accommodation to a meal, ultrasound, MRI, and SPECT have been proposed. The recently introduced SPECT requires an intravenous injection of  $^{99m}\text{Tc}$ -pertechnetate, which the gastric mucosa specifically takes up, and specialized imaging and analysis, which have potential to be automated. Thus, novel, noninvasive approaches assess different dimensions of gastric motility and sensation testing. With further development of these techniques, refinement of their conduct and analysis, and validation of clinical usefulness, they are likely to be applicable in clinical practice to enhance cost-effective, evidence-based management of upper gastrointestinal symptoms. Such applications may provide an alternative to sequential empirical trials for symptoms.

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TI: Calcium and phosphate regulation of nitrogen metabolism in the cyanobacterium Spirulina platensis under the high light stress.

AU: Singh, -D-P; Singh, -N

AD: School of Environmental Sciences, B.R.Ambedkar University, Lucknow-226025, India.

SO: Curr-Microbiol. 2008 Nov; 41(5): 368-73

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LA: English

AB: High light stress (40 W/m<sup>2</sup>)-induced alterations in the nitrogen assimilatory enzymes in Spirulina platensis were studied under the Ca(2+) and phosphate (Pi)-supplemented as well as starved conditions. Results revealed that activities of nitrate reductase (NR), amino acid transferases (AST/GOT and ALT/GPT), and protease enzymes in the high-light-incubated cells were relatively higher under the Ca(2+)- and Pi-starved conditions. On the contrary, relative rates of glutamine synthetase (GS) and ATPase activities were lower in the Ca(2+)- and Pi-starved cells. But the Spirulina cells under the Ca(2+)- and Pi-added conditions showed enhanced activity of both GS and ATPase enzymes. During the high-light stress, a decline in the GS activity, particularly under the Ca(2+)- and Pi-starved conditions, was indicative of a nitrogen starvation-like condition. This could be one of the reasons for induction of the NR and protease enzymes. A higher rate of GS activity was recorded under both the Ca(2+)- and Pi-supplemented conditions, perhaps owing to the enhanced rate of ATPase activity in such conditions. But a declining pattern of both NR and protease activities in the presence of Ca(2+) and Pi, despite the higher rate of ATPase activity, might involve some other mechanism like the protein-kinase system.

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TI: The presence of a SO molecule in [NiFe] hydrogenase from Desulfovibrio vulgaris Miyazaki as detected by mass spectrometry.

AU: Higuchi, -Y; Toujou, -F; Tsukamoto, -K; Yagi, -T

AD: Division of Chemistry, Graduate School of Science, Kyoto University, Japan. higuchi@kuchem.kyoto-u.ac.jp

SO: J-Inorg-Biochem. 2008 Jul 1; 98(3-4): 295-11

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LA: English

AB: The active site of [NiFe] hydrogenase is a binuclear metal complex composed of Fe and Ni atoms and is called the Ni-Fe site, where the Fe atom is known to be coordinated to three diatomic ligands. Two mass spectrometric techniques, pyrolysis-MS (pyrolysis-mass spectrometry) and TOF-SIMS (time-of-flight secondary ion mass spectrometry), were applied to several proteins, including

native and denatured forms of [NiFe] hydrogenase from *Desulfococcus vulgaris* Miyazaki F, [FeS<sub>4</sub>]<sub>2</sub>-ferredoxin from *Clostridium pasteurianum*, [Fe<sub>2</sub>S<sub>2</sub>]<sub>2</sub>-ferredoxin from *Spirulina platensis*, and porcine pepsin. Pyrolysis-MS revealed that only native hydrogenase liberated SO/SO<sub>2</sub> (ions of *m/z* 48 and 64 at an equilibrium ratio of SO and SO<sub>2</sub>) at relatively low temperatures before the covalent bonds in the polypeptide moiety started to decompose. TDF-SIMS indicated that native Miyazaki hydrogenase released SO/SO<sub>2</sub> (*m/z* 47.97 and 63.96) as secondary ions when irradiated with a high-energy Ca<sup>+</sup> beam. Denatured hydrogenase, clostridial ferredoxin, and pepsin did not release SO as a secondary ion. The FT-IR spectrum of the enzyme suggested the presence of CO and CN. These lines of evidence suggest that the three diatomic ligands coordinated to the Fe atom at the Ni-Fe site in Miyazaki hydrogenase are SO, CO, and CN. The role of the SO ligand in helping to cleave H<sub>2</sub> molecules at the active site and stabilizing the Fe atom in the diamagnetic Fe(II) state in the redox cycle of this enzyme is discussed.

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TI: Thermal behavior of long wavelength absorption transitions in *Spirulina platensis*-photosystem I trimers.

AU: Cometta, -A; Zucchelli, -G; Karapetyan, -N-V; Engelmann, -E; Garlaschi, -F-M; Jennings, -R-C

AD: Centro CNR Biologia Cellulare e Molecolare delle Piante, Dipartimento di Biologia, Università di Milano, 20133 Milano, Italy.

SO: Biophys.-J. 2000 Dec; 79(6): 3235-43

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LA: English

AB: In photosystem I trimers of *Spirulina platensis* a major long wavelength transition is irreversibly bleached by illumination with high-intensity white light. The photobleaching hole, identified by both absorption and circular dichroism spectroscopies, is interpreted as the inhomogeneously broadened Q(y) transition of a chlorophyll form that absorbs maximally near 709 nm at room temperature. Analysis of the mean square deviation of the photobleaching hole between 80 and 300 K, in the linear electron-phonon frame, indicates that the optical reorganization energy is 52 cm<sup>-1</sup>, four times greater than that for the bulk, short-wavelength-absorbing chlorophylls, and the inhomogeneous site distribution bandwidth is close to 150 cm<sup>-1</sup>. The room temperature bandwidth, close to 18.5 nm, is dominated by thermal (homogeneous) broadening. Photobleaching induces correlated circular dichroism changes, of opposite sign, at 709 and 670 nm, which suggests that the long wavelength transition may be a low energy excitonic band, in agreement with its high reorganization energy. Clear identification of the 709-nm spectral form was used in developing a Gaussian description of the long wavelength absorption tail by analyzing the changing band shape during photobleaching using a global decomposition procedure. Additional absorption states near 720, 733, and 743 nm were thus identified. The lowest energy state at 743 nm is present in substoichiometric levels at room temperature and its presence was confirmed by fluorescence spectroscopy. This state displays an unusual increase in intensity upon lowering the temperature, which is successfully described by assuming the presence of low-lying, thermally populated states.

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TI: Probing magnetic properties of the reduced [2Fe-2S] cluster of the ferredoxin from *Arthrospira platensis* by 1H ENDOR spectroscopy.

AU: Canne, -C; Ebelhauser, -M; Gay, -E; Shergill, -J-K; Damack, -R; Kappl, -R; Huttermann, -J

AD: Fachrichtung Physik und Physikalische Grundlagen der Medizin, Universität des Saarlandes, Homburg/Saar, Germany.

SO: J-Biol-Inorg-Chem. 2000 Aug; 5(4): 514-26

LA: English

AB: The 1H electron nuclear double resonance (ENDOR) spectra in frozen solutions of the reduced [2Fe-2S] cluster in ferredoxin from *Arthrospira (Spirulina) platensis* have been measured at low temperatures (5-20 K) and simulated using orientational selection methods. The analysis confirmed the existence of a single paramagnetic species with iron valence states II and III connected uniquely to the cluster irons. The experimental ENDOR spectra were fitted to a model including the spin distribution on the centre, the orientation of the g-matrix, and the isotropic and anisotropic hyperfine couplings of the nearest protons in the crystallographically determined structure. In order to partially simulate ENDOR line shapes, a statistical distribution of the corresponding torsion angles between the Fe(III) centre and one of the beta-CH2 protons was introduced. From the analysis, four of the larger hyperfine couplings found were assigned to the cysteine beta-protons near the Fe(III) ion of the cluster, with isotropic hyperfine couplings ranging from 1.6 to 4.1 MHz. The spin distribution on the two iron ions was estimated to be +1.85 for the Fe(III) ion and -0.9 for the Fe(II) ion. The Fe(III) ion was identified as being coordinated to the cysteine ligands Cys49 and Cys79, confirming previous NMR results. The direction of the g-tensor with respect to the cluster was deduced. The g1-g2 plane is parallel to the planes through each iron and its adjacent cysteine sulfurs; the g2-g3 plane is nearly perpendicular to the latter planes and deviates by 25 degrees from the FeSSFe plane. The g1 direction is dominated by the bonding geometry of Fe(II) and does not align with the Fe(II)-Fe(III) vector.

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TI: Selective inhibition of cyclooxygenase-2 by C-phycocyanin, a biliprotein from *Spirulina platensis*.

AU: Reddy, C-N; Bhat, V-B; Kiranmai, G; Reddy, M-N; Reddanna, P; Madyastha, K-M  
AD: Department of Organic Chemistry, Indian Institute of Science, Bangalore, 560 012, India.

SO: Biochem-Biophys-Res-Commun. 2000 Nov 2; 277(3): 599-603

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LA: English

AB: We report data from two related assay systems (isolated enzyme assays and whole blood assays) that C-phycocyanin a biliprotein from *Spirulina platensis* is a selective inhibitor of cyclooxygenase-2 (COX-2) with a very low IC(50) COX-2/IC(50) COX-1 ratio (0.04). The extent of inhibition depends on the period of preincubation of phycocyanin with COX-2, but without any effect on the period of preincubation with COX-1. The IC(50) value obtained for the inhibition of COX-2 by phycocyanin is much lower (180 nM) as compared to those of celecoxib (255 nM) and rofecoxib (301 nM), the well-known selective COX-2 inhibitors. In the human whole blood assay, phycocyanin very efficiently inhibited COX-2 with an IC(50) value of 80 nM. Reduced phycocyanin and phycocyanobilin, the chromophore of phycocyanin are poor inhibitors of COX-2 without COX-2 selectivity. This suggests that apoprotein in phycocyanin plays a key role in the selective inhibition of COX-2. The present study points out that the hepatoprotective, anti-inflammatory, and anti-arthritic properties of phycocyanin reported in the literature may be due, in part, to its selective COX-2 inhibitory property, although its ability to efficiently scavenge free radicals and effectively inhibit lipid peroxidation may also be involved.  
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TI: Toxicity of triphenyltin to *Spirulina subsalsa*.

AU: Zhihui, S; Guolan, H

AD: College of Environmental Sciences and Engineering, Nankai University, Tianjin, People's Republic of China.

SO: Bull-Environ-Contam-Toxicol. 2000 May; 64(5): 723-8

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TI: Lipid profile: a useful chemotaxonomic marker for classification of a new cyanobacterium in Spirulina genus.

AU: Romano,-I; Bellitti,-M-R; Nicolaus,-B; Lama,-L; Manca,-M-C; Pagnotta,-E; Sambacora,-A

AD: Istituto per la Chimica di Molecole di Interesse Biologico, CNR, Arco Felice, Na., Italy.

SO: Phytochemistry. 2000 Jun; 54(3): 289-94

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LA: English

AB: The morphological, physiological and genetic characteristics of an isolate cyanobacterium from hard sand of the lake Venere in the Pantelleria island (Italy) were described. The isolate with a small-size coiled helix shape, growing optimally at pH 9.2-9.5 at 30 degrees C under continuous illumination and aeration, possessed a 61.5 mol% of Guanine + Cytosine content of DNA. The lipid profile showed the presence of mono-, di-glycosyl, sulphoquinovosyl and phosphatidyl (MGDG, DGDG, SQDG and PG). The fatty acid profile was also studied, characterized by the absence of gamma-linolenic acid and the presence of saturated and monounsaturated C16 and C18. The latter was also present as a dienoic component. The fatty acid composition was affected by growth temperature by increasing the degree of desaturation at a lower temperature and the biosynthesis of shorter acyl chains. The effects of growth conditions other than temperature, physical, nutritional and chemical on lipid composition were also studied. The overall features of the cyanobacterium isolated from Pantelleria clustered it into Spirulina genus.